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Recycling and Energy Recovery from Waste

Brigitte Weber
Editor-in-Chief

In July this year, the United Nations General Assembly declared that everyone on the planet has a right to a healthy environment. The resolution was adopted with 161 votes in favor and eight abstentions. However, the decision is not legally binding on the 193 UN Member States. But it would come as the planet grapples with a triple planetary crisis of climate change, nature and biodiversity loss, and pollution and waste, the UN Environment Programme wrote on its homepage. According to Carlos Silva Filho, president of the International Solid Waste Association, this human right can only be achieved with sound waste management.

Experience has shown that responsible waste management can sustainably reduce the burden on the environment. That is why – apart from recycling – also the energy recovery from municipal solid waste is included. Waste-to-energy can decrease the volume of solid waste destined for landfills and recover energy from the waste burning process. “This generates a renewable energy source and reduces carbon emissions by offsetting the need for energy from fossil sources and reduces methane generation from landfills,” the U.S. Environmental Protection Agency underlined. However, energy recovery from waste should be considered as one of the last options at the end of life, after reuse, refurbishing and recycling.

But extraordinary times call for extraordinary measures. “The Russian invasion of Ukraine has introduced new challenges for the energy sector along the entire value chain in Europe and around the globe. Against this dramatic backdrop, it is nevertheless paramount not to let go of decarbonization ambitions,” the international professional services network Deloitte emphasized in a press release regarding the study “Transform to React: Climate Policy in the New World Order”. Accelerating the clean energy transition was an obvious path towards more geopolitical resilience as it would decrease fossil fuel energy dependencies, while also contributing to mitigating climate change. The report’s policy recommendations include suggestions for governments and companies. The latter should inter alia “pursue comprehensive restructuring and diversification processes beyond energy sources (i.e., strategic raw materials and goods)”. And they should also diversify investment portfolios, “not only in terms of fossil fuels, but also in terms of low-carbon energy technologies”.

In this issue, you can find articles that show how recycling and waste-to-energy can contribute to the climate protection goals. The EU is investing in clean tech projects (page 3). Regarding renewable energy sources, there are promising projects developing, for example, fuels or hydrogen from sludge, tires, plastic, and organic material (pages 6 to 13), to name but a few. Furthermore, the preparation of RDF (Refuse Derived Fuel) and SRF (Solid Recovered Fuel) is also an issue (page 47).

We hope you get a lot of new and useful information from reading this current magazine.

Yours
Brigitte Weber (weber@msvgmbh.eu)

Cover Photo: Sennebogen

European Innovation Fund:

EU INVESTS IN CLEAN TECH PROJECTS

In July this year, the European Commission announced that the EU is investing over 1.8 billion Euro in 17 large-scale innovative clean-tech projects with a third round of awards under the Innovation Fund.

As reported, grants will be disbursed from the Innovation Fund to help bring breakthrough technologies to the market. The selected projects are located in Bulgaria, Finland, France, Germany, Iceland, the Netherlands, Norway, Poland and Sweden. "The Innovation Fund is an important tool to scale up innovations in renewable hydrogen and other solutions for European industry," the EU Commission's Executive Vice-President, Frans Timmermans, was cited. "Compared to the first disbursement round, the funds available have increased by 60 percent, enabling us to double the number of projects supported. This is a big boost for the decarburization of energy-intensive industry in the European Union."

The 17 projects were selected under the second call for large-scale projects, meaning they have capital costs above 7.5 million Euro. According to the European Commission, the projects were evaluated by independent experts "based on their ability to reduce greenhouse gas emissions compared to traditional technologies and to innovate beyond the state-of-the-art, while being sufficiently mature for deployment". Other selection criteria included the projects' potential for scalability and cost-effectiveness.

The selected projects cover a wide range of sectors contributing to the EU's decarburization efforts such as production, distribution and use of green hydrogen, waste-to-hydrogen, offshore wind, manufacturing of photovoltaic (PV) modules, battery storage and recycling, carbon capture and storage, sustainable aviation fuels, and advanced biofuels. Together, they have the potential to save 136 million tons of CO_2eq over their first ten years of operation, the information said.

Projects in brief

Cement (4 projects): A project in Germany will deploy a second-generation oxyfuel carbon capture process at a cement plant and provide it as raw material for further processing into synthetic methanol. Another one in Poland will create an end-to-end carbon capture and storage chain starting from CO_2 capture and liquefaction at a cement plant to storage in offshore sites. A third project will capture the CO_2 emissions from exhaust gases produced during lime production and store them permanently in offshore geological formations in France. Finally, another project will be the first full-chain carbon capture and storage project in Bulgaria, linking CO_2 capture facilities at a cement plant with offshore permanent storage in a depleted gas field in the Black Sea, through an onshore and offshore pipeline system.

Chemicals (3 projects): In Finland, a project will chemically recycle plastics to be used as a feedstock for refineries. Another project in Sweden will create a first-of-a-kind methanol plant converting CO_2, residue streams, renewable hydrogen and biogas to methanol. Another project in Finland will produce a new fiber from pulp to substitute polyester in textile applications.

Hydrogen (3 projects): In the Netherlands, one project will produce, distribute and use green hydrogen through an electrolyzer supplied by offshore wind electricity. Another one will produce 15,500 tons of renewable hydrogen per year. The third one will process non-recyclable solid waste streams and transform them primarily into hydrogen.

Refineries (2 projects): In Norway, one project will build and operate the world's first commercial-scale drop-in biofuel production facility, converting forestry waste into advanced second-generation biofuels and bio char. A project in Sweden will build a large-scale facility for producing synthetic sustainable aviation fuel, using CO_2

Photo: Yves Bernardi / pixabay.com

captured at a Combined Heat and Power (CHP) plant.

Manufacturing of components for energy storage or renewables production (3 projects): In Poland, a project will create a manufacturing plant of innovative electrochemical battery systems to provide short-term electricity storage. Another project in the North of France will build a manufacturing plant for photovoltaics based on innovative heterojunction technology. A third project in France will construct a Li-Ion recycling plant at the Dunkirk battery cluster for producing and refining black mass, providing access to a secondary source of battery raw material.

Renewable energy: In the German part of the North Sea, a project will construct and operate an offshore windfarm, which will implement innovative solutions for turbines and hydrogen.

Carbon capture and storage infrastructure: A project in Iceland will build a highly scalable onshore carbon mineral storage terminal with an estimated overall storage capacity of 880 million tons of CO_2.

https://ec.europa.eu/clima/eu-action/funding-climate-action/innovation-fund_en

European Union:

PARLIAMENT ADVOCATES GREEN AVIATION FUELS

In the European Union, civil aviation accounts for 13.4 percent of total CO_2 emissions from transport. According to the European Parliament, used cooking oil, recycled carbon fuels, synthetic fuel or hydrogen should gradually become the norm as aviation fuel to help the EU become climate neutral by 2050.

In July this year, the Members of the Parliament (MEPs) adopted a new draft EU rules to increase the uptake of sustainable fuels by EU planes and airports to cut emissions from aviation. In doing so, they increased the EU Commission's original proposal for the minimum share of a sustainable aviation fuel that should be made available at EU airports. From 2025, this share should be two percent, increasing to 37 percent in 2040 and 85 percent by 2050, "taking into account the potential of electricity and hydrogen in the overall fuel mix", a press release said. The European Commission had proposed 32 percent for 2040 and 63 percent for 2050.

More types of sustainable fuel

As reported, the Parliament amended the proposed definition of sustainable aviation fuel, a term that covers synthetic fuels or certain biofuels, produced from agricultural or forestry residues, algae, bio-waste or used cooking oil. The politicians "included under their definition recycled carbon fuels produced from waste processing gas, and exhaust gas deriving from production process in industrial installations," the Parliament gave account. "They also suggested some biofuels, produced from animal fats or distillates, could be included in the aviation fuel mix for a limited time (until 2034). However, MEPs excluded feed and food crop-based fuels, and those derived from palm oil, soy-derived materials and soap stock, because they do not align with the proposed sustainability criteria."

It is planned that also renewable electricity and hydrogen as part of a sustainable fuel mix will be included, "as both are promising technologies that could progressively contribute to the decarbonization of air transport". According to the draft rules, EU airports should facilitate the access of aircraft operators to sustainable aviation fuels, including infrastructure for hydrogen refueling and electric recharging.

Part of the European Union's "Fit for 55 in 2030 package" is the ReFuelEU Aviation initiative, the EU's strategy to reduce greenhouse gas emissions by at least 55 percent by 2030 compared to 1990 levels, in line with the European Climate Law.

New fund and green labeling

"Parliament proposed the creation of a Sustainable Aviation Fund from 2023 to 2050 to accelerate the decarbonization of the aviation sector and support investment in sustainable aviation fuels, innovative aircraft propulsion technologies, and research for new engines," the information said. "The Fund would be supplemented by penalties generated by the enforcement of these rules."

To further promote the decarbonization of the aviation sector and to inform the public about greener aviation, MEPs tasked the Commission with developing by 2024 an EU labeling system on the environmental performance of aircrafts, operators and commercial flights.

As stated, the Parliament is now ready to start negotiations with member states.

www.europarl.europa.eu

SUSTAINABLE AVIATION FUEL MARKET TO GROW

The market is expected to exhibit a tremendous compound annual growth rate (CAGR) of 60 percent over the forecast period of 2022-2032. According to an analysis provided by Future Market Insights Global and Consulting Pvt. Ltd., the global sustainable aviation fuel market will reach an estimated value of 15 billion US-Dollar in 2030, scaling up from a value of 220 million US-Dollar in 2021.

In use since 2008, sustainable aviation fuel (SAF) is obtained from biomass and organic waste resources. “Advances in technologies have enabled SAF to be used in all kinds of petroleum-based fuel engines,” the market research organization described the situation. “This will bode well for the sustainable aviation fuel market by opening up new market opportunities.” Owing to its production from renewable sources as well as enhancements in aero-engine efficiency by design modification, such fuels were projected to gain traction as a sustainable alternative fuel in the upcoming years. Increasing focus on carbon footprint reduction to secure a sustainable environment coupled with the implementation of stringent rules and regulations by governments worldwide would aid the market growth.

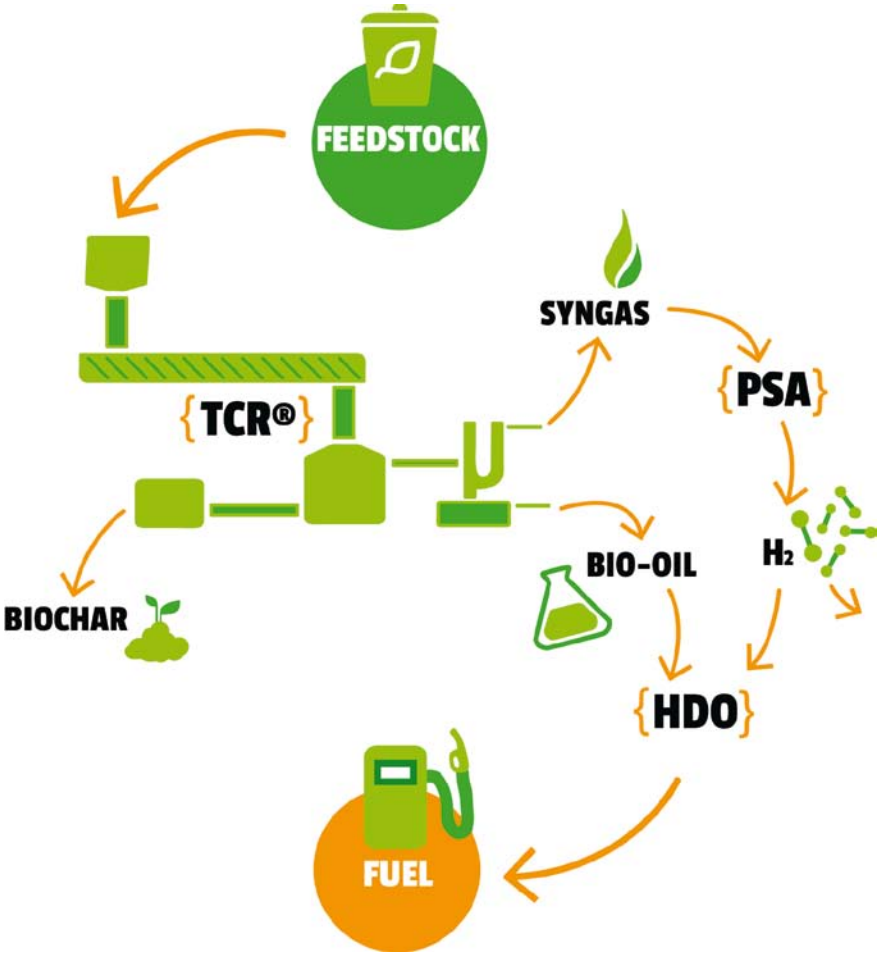
As stated, increasing incomes, a rise in the number of airline passengers, growing air travel, and a rise in the use of synthetic lubricants are factors that will contribute to the anticipated market development. “The use of sustainable aviation fuel is widely accepted as the most feasible and reliable alternative fuel solution in terms of socio-economic benefits. Sustainable aviation fuel also mitigates the aviation industry’s present and future impact on the environment,” Future Market Insights wrote. All these factors were expected to boost the market.

The North American SAF market is projected to grow at the fastest CAGR. The United States and Canada were undertaking various sustainable aviation fuel projects and initiatives like Commercial Aviation Alternative Fuel Initiative (CAAFI), Midwest Aviation Sustainable Biofuels Initiative (MASBI), and Canada‘s Biojet Supply Chain Initiative. Furthermore, supportive legislations and mass measures adopted to reduce aviation measures in the USA would create a viable market environment. Due to its application in the commercial and technological pathways as an alternative to jet fuel, the biofuel segment is identified as the largest sustainable aviation fuel market based on fuel type. The Netherlands, Norway, and the U.K. are some of the biggest investors in this segment, the company underlined.

www.futuremarketinsights.com/reports/brochure/rep-gb-14269

TURNING SEWAGE SLUDGE INTO FUELS AND HYDROGEN

Climate change and energy shortages spur innovations.



In August, USA-based financial, software, data, and media company Bloomberg reported that Northwest Europe "is forecast to begin a perilous winter with historically low amounts of diesel, a fuel that powers vast swaths of the economy". The region's stockpiles of road diesel, heating oil and other diesel-type fuel were set to shrink this November "to the lowest level in data that goes back to the start of 2011", wrote author Jack Wittels, referring to information from global research and consultancy group Wood Mackenzie Ltd. Likewise, market research company Insight Global had figured out that in the Amsterdam-Rotterdam-Antwerp oil-trading hub inventories were at the lowest level for the time of year since at least 2008, he gave account. "Europe is structurally short of diesel-type fuel, regularly receiving cargoes from overseas. That natural shortage could become more of a problem early next year when an EU ban on seaborne imports from Russia – currently the continent's single-biggest external supplier – is set to take effect." This was just one part of a broader energy crisis that had "engulfed the continent following Russia's invasion of Ukraine, sending the prices of natural gas and electricity soaring and fanning inflation".

Energy sources from sewage sludge

A way out of this situation – especially in Europe – could be, inter alia, the European project TO-SYN-FUEL aiming at the production of green hydrogen, diesel and gasoline from sewage sludge. Furthermore, if successful, it could be a showcase example for future sustainable investment and economic growth across Europe, the project consortium with 11 partner organizations is convinced. Horizon 2020, the EU's research and innovation program funded the undertaking, which ended after more than five years in September 2022.

As reported, TO-SYN-FUEL implements a new integrated process – combining Thermo-Catalytic Reforming (TCR), with hydrogen separation through pressure swing adsorption (PSA), and hydrodeoxygenation (HDO) – to produce a fully equivalent gasoline and diesel substitute (compliant with EN228 and EN590 European Standards) and green hydrogen for use in transport. "This project will be the platform for deployment of a subsequent commercial-scale facility. This will be the first of its kind to be built anywhere in the world, processing organic industrial wastes directly into transportation grade biofuels – fuels, which will be a demonstration showcase for future sustainable investment and economic growth across Europe," one can read on the project website (🌐 www.tosynfuel.eu). The initiative would mark "the first pre-commercial scale deployment of the technology" processing up to 2,100 tons per year of dried sewage sludge into 210,000 liters per year of liquid biofuels and up to 30,000 kilograms of green hydrogen.

According to an article published in April this year by the quarterly online journal Open Access Government, the first testing campaigns with TCR have shown "a very satisfying performance". Within more than 500 operational hours, over 200 tons of dried sewage sludge had been converted into 20,000+ liters of TCR oil, Robert Daschner from German Fraunhofer-Institut für Umwelt-, Sicherheits- und Energietechnik UMSICHT stated, referring

Source: TO-SYN-FUEL

to November 2021. The yield and the quality of the products achieved were within expectations. In the last step of the project, further campaigns were planned to process 12 tons of dried sludge per day and to gain more long-term experience with the technology.

Concerning the overall efficiency of the plant, "it is known from pre-tests of small-scale experiments that up to 90 percent of the energy can be transferred from the feedstock to the products, and that around 10 percent of energy from feedstock is needed as heating energy", Robert Daschner wrote. "Specifically, the liquid bio-oil produced by TCR has a high heating value."

About the project

The TO-SYN-FUEL project combines the knowledge and expertise of stakeholders from industry, research and technology development, utilities and services, fuel distribution, government and NGOs in a partnership. Partners include: Engie Services Netherlands NV, HyGear Technology and Services BV (The Netherlands), Fraunhofer UMSICHT, Verfahrenstechnik Schwedt GmbH, Martech GmbH (Germany), Alma Mater Studiorum – University of Bologna, Eni SpA, ETA–Florence Renewable Energies (Italy), University of Birmingham, WRG Europe Ltd (UK) and LEITAT (Spain). The project had a total duration of 65 months starting in May 2017 to September 2022, and was funded by the European Union under the Horizon 2020 program.

Stakeholders welcome

On the TO-SYN-FUEL website, the consortium invites future stakeholders: "If you would like to become more involved with the project platform and include your organization details in the TO-SYN-FUEL Stakeholder Database, please use the Stakeholder Registration Form." It can be found here
🌐 www.tosynfuel.eu/?page_id=2489.

THE GLOBAL TIRE DERIVED FUEL MARKET

This worldwide market is expected to reach the value of 510.91 million US-Dollar by the end of 2031, USA-based Transparency Market Research Inc. informed.

In 2020, the market was valued at 373.06 million US-Dollar. Increasing applications of scrap tires as tire-derived fuel (TDF) in pulp & paper mills, cement manufacturing, and utility boiler industries were creating revenue opportunities for tire-derived fuel players, the firm stated. "Growing awareness about scrap tire waste in landfills and rising demand from the auto industry across developed regions are expected to drive the global market for tire-derived fuel soon. Tire landfills are undesirable, as they become breeding grounds for mosquitoes and other disease-carrying pests. It is also common for these landfills to catch fire and release thick toxic smoke. The low recovery rate due to lack of infrastructure and minimal government regulations in developing countries of Asia is likely to hamper the tire-derived fuel market in the region during the forecast period."

Replacement of other fuels

When burned, tires generate the same amount of energy as oil, 25 to 50 percent more energy than coal, and 100 to 200 percent more energy than wood, Transparency Market Research gave account. The U.S. Environmental Protection Agency (EPA) and state-testing facilities had shown that TDF produces low emissions compared to other conventional fuels. "At well-controlled facilities, emissions are considerably less when TDF is used to replace some of the typical fuels used at the facilities. As a result, the EPA has recommended the use of tire-derived fuel as a viable alternative to the use of fossil fuels. Hence, facilities such as utility boilers, cement kilns, and pulp & paper mills use TDF as a supplemental fuel in their energy-intensive processes." The usage of TDF would reduce the amount of fossil fuels. Furthermore, it is less expensive. "All these factors are driving the demand for tire-derived fuel."

Photo: O. Kürth

Growth Opportunities for TDF market players in Asia Pacific

According to the market research firm, Asia Pacific, a key region of the market, is expected to account for a major share of the worldwide market. Japan is expected to be a prominent region, as millions of scrap tires were being generated in the country every year. However, the demand for tire-derived fuel in India is projected to rise at a rapid pace during the forecast period. "The production of new tires is very high in India, creating value-grab opportunities for the market players."

🌐 www.transparencymarketresearch.com/sample/sample.php?flag=B&rep_id=37274

Finland:

VTT AND NESTE TO BUILD A POWER-TO-LIQUIDS DEMONSTRATION PLANT

VTT Technical Research Centre of Finland and Neste Oyj have agreed to build a technology demonstration facility.

Power-to-Liquids technologies are on their way to commercialization in scale, Neste underlined in June this year. E-fuels would offer a way to expand the carbon-neutral transport fuel pool beyond biomass-based renewable fuels to replace fossil fuels in existing internal combustion engines. "The end product is a transportation fuel suited for aircraft, ships, as well as heavy and light road vehicles," the company that refines waste, residues and innovative raw materials, said. Since the development of high-temperature electrolysis, CO_2 capture, and hydrocarbon synthesis technologies have been completed in the Veturi e-fuel research project, "the integrated technology is now ready for implementation".

Photo: Neste

The future technology demonstration facility will be located at VTT Bioruukki Pilot Center in Espoo. According to Neste, the work started by first modifications to the research infrastructure at VTT Bioruukki. During 2022 and early 2023, electrolysis, CO_2 capture, and synthesis units located in sea containers would be connected and the research infrastructure. The pilot runs of the project are expected to be completed by 2023. As reported, the technology demonstration will employ CO_2 capture from flue gas, hydrogen production by high-temperature electrolysis and fuel synthesis based on the Fischer-Tropsch technology. "Both the CO_2 capture and electrolysis solutions are provided by Finnish project partners, Kleener Power Solutions Oy and Carbonreuse Finland Oy as well as Convion Oy and Elcogen Oy, respectively. VTT will provide the fuel synthesis unit and technology and Neste carries out upgrading of the synthetic crude oil into fuel products fulfilling the specifications," Neste informed. The company is expecting to see a successfully integrated demonstration of technologies and to receive at least 300 kilograms of synthetic crude oil for synthetic fuel processing development.

www.neste.com

Switzerland:

HITACHI ZOSEN INOVA STARTS GREEN HYDROGEN PRODUCTION FACILITY

Hitachi Zosen Inova (HZI) and the Aarau-Lenzburg Regional Waste Disposal Association (Gemeindeverband für Kehrichtbeseitigung Region Aarau-Lenzburg or GEKAL) will produce hydrogen at the waste-to-energy plant in Buchs (canton of Aargau).

It is planned that the first hydrogen will be produced at the beginning of 2023. "Full operations will commence a few months later in the spring of 2023," HZI announced in March. "The main off-taker of the hydrogen will be Messer Schweiz AG in Lenzburg." That company specializes in the supply of industrial gases. The new plant "will represent a valuable, and above all, local source of green hydrogen, enhancing the circular dimension of the thermal recycling facility," HZI commented.

The joint venture project will involve the Swiss-Japanese cleantech company constructing the first Waste to

Photos: HZI

Hydrogen (WtH2) small-scale commercial plant, a press release said. HZI would take care of all planning and construction work for the facility at the GEKAL site, and will also be the owner and operator in the first few years. "The hydrogen produced will be used as technical gas for industry and early mobility applications, for example, as green fuel for local public transport and private vehicles." HZI intends to produce hydrogen and oxygen by electrolysis using electricity from the Buchs Energy from Waste (EfW) plant. "The oxygen will be released into the atmosphere, while the hydrogen will be compressed and stored in special tanks."

HZI will use an alkaline electrolysis process that can produce 550 Nm^3/h (standard cubic meters per hour) of green hydrogen at 350 bar, "meeting both the SAE 2719 and ISO 14687 quality standards for hydrogen fuel". The plant would also include a filling station. "Its projected output is around 200 tons of hydrogen per year, equivalent to approximately 10-15 gigawatt hours of electricity." This was enough to keep a hydrogen-powered vehicle running for around 20 million kilometers, or to fuel up to 1,000 fuel cell cars per year.

Negative compensation is possible

According to the information, the new Green Hydrogen production facility will be integrated into the Swissgrid secondary control service framework, a novel concept for steering demand and oversupply within the Swiss power grid. "When a primary producer goes offline, secondary producers such as the EfW plant in Buchs are brought online to stabilize the grid," the information said. "So-called negative compensation is also possible if too much renewable energy is produced compared with the planned volume. In this situation, the hydrogen facility will draw up to 2 MW from the grid, meaning that renewable energy producers such as wind farms will not need to be taken offline immediately or perhaps even at all."

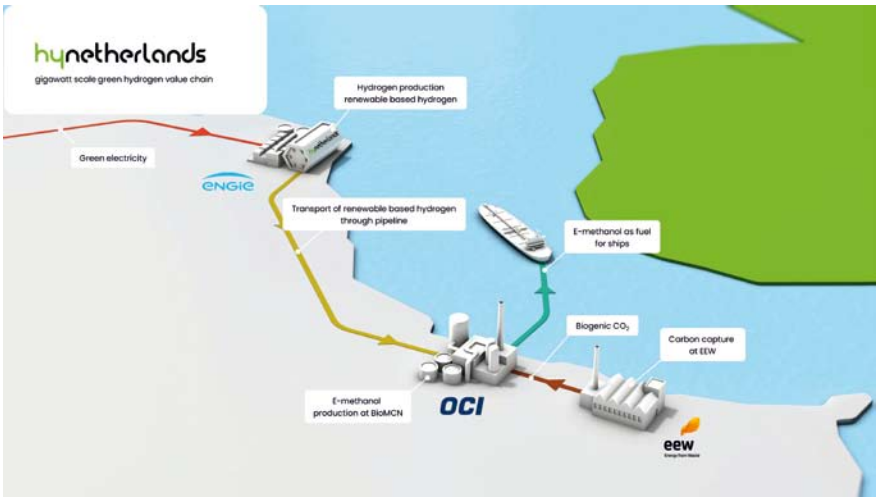
www.hz-inova.com

PARTNERSHIP TO DEVELOP A LARGE-SCALE HYDROGEN-BASED VALUE

The three enterprises ENGIE, OCI and EEW intend to realize a large-scale industrial value chain in Europe for the production of e-methanol.

In May this year, ENGIE (the global point of reference in renewable hydrogen, low-carbon energy and services), OCI (Europe's largest methanol producer), and EEW (a leading company in the production of electricity and heat from the thermal recovery of waste), announced their collaboration with the ambition to deploy the HyNetherlands (HyNL) project. The firms reported that HyNetherlands aims "to develop, build, and operate one of the first large-scale industrial value chains in Europe for the production of e-methanol by combining renewable hydrogen and biogenic CO_2 in the North of the Netherlands (Groningen province)". Hydrogen and e-methanol were sustainable and high-performing energy carriers that would match the characteristics of their fossil counterparts: They have high energy density, they are easy to bunker and transport, and they use existing assets and infrastructure.

The first phase of the project will consist of a new 100 MW electrolyser facility that will produce hydrogen for e-methanol production and deliver renewable-based hydrogen to the local mobility and industry sectors, the companies said in a joint press release. The project will connect individual industrial sites at three different locations:



Source: ENGIE Energie Nederland

- The ENGIE hydrogen production site will be located on the site of the Eems power plant in Eemshaven. The 100 MW electrolyser will be powered by 200 MW capacity of offshore wind turbines.
- The EEW carbon capture plant will be integrated with the existing waste-to-energy plant in Farmsum. It will capture biogenic CO_2 from the flue gases of the plant's production lines. CO_2 logistics and infrastructure will intentionally be provided by Groningen Seaports.
- OCI's BioMCN methanol facility, located in the Delfzijl chemical park in Farmsum, has the capacity to combine hydrogen and biogenic CO_2 to produce e-methanol.
- The plants of ENGIE (production) and OCI/BioMCN (offtake) will be connected to the hydrogen network that Gasunie is developing throughout the Netherlands and Northern Germany. The vast majority of the national network for hydrogen will consist of pipelines currently used for natural gas transportation.

"Obtaining the necessary financial support and government approvals for the project are key priorities," the companies gave account. "To this end, the project has already applied for grants from the European authorities (Innovation Fund)."

The long-term vision is for HyNL to play an increasingly important role in the decarbonization of industrial and transportation sectors in the region, with plans to scale up electrolyser production capacity from 100MW in 2025 to 1.85 GW in the early 2030s.

- www.engie.com/en
- www.oci.nl
- www.eew-energyfromwaste.com

HYDROGEN FUEL FROM PLASTIC WASTE

Hydrogen is an energy carrier. This clean fuel can be produced from a variety of domestic resources, such as natural gas, nuclear power, biomass, and renewable power like solar and wind. Furthermore, there is a way to produce Hydrogen from plastic waste.

As reported by Nanyang Technological University (NTU) in Singapore, scientists at the university have developed a new method for plastic waste to be converted into hydrogen based on pyrolysis, a high-temperature chemical process. Using this two-stage technique, plastic litter can be converted into two main products – hydrogen and a form of solid carbon – called carbon nanotubes, with water as the only by-product.

Different types of plastics, including marine waste litter in the middle, that can be turned into hydrogen and carbon nanotubes using NTU Singapore's pilot plant

Photo: NTU

"To further refine the new conversion method and to assess its commercial feasibility, the research team is test-bedding it on the NTU Smart Campus to treat local plastic waste, in partnership with Bluefield Renewable Energy, a local environmental firm that specializes in mobile waste to resources technologies," NTU informed in April this year. "The multimillion-dollar research joint project, supported by the Industry Alignment Fund-Industry Collaboration Projects (IAF-ICP) administered by Singapore's Agency for Science, Technology and Research (A*STAR), aims to develop feasible solutions to economically scale up the conversion of waste plastics to hydrogen over the next three years." The project would also explore the potential of other emerging technologies for decentralized waste management. The conversion of challenging waste streams into energy and valuable resources, such as syngas, biochar, activated carbon and carbon nanotubes would be investigated.

With 832 million kilograms of unrecycled plastic waste generated in Singapore annually – according to the National Environmental Agency in 2020 – the converted energy could potentially power up to 1,000 five-room apartments for a year, the NTU scientists estimated. Also, the solid carbon from the conversion process was much easier to store as compared to gaseous CO_2 emissions from plastic waste incineration. Furthermore, the solid carbon could be easily sold as a manufacturing feedstock for specialty chemicals or biofuels.

If the initiative is successful, it would help Singapore reduce the amount of total waste disposed of and prolong the lifespan of Singapore's only landfill, Semakau Landfill, which is estimated to run out of space by 2035.

www.ntu.edu.sg

EUROPEAN E-FUELS CONFERENCE

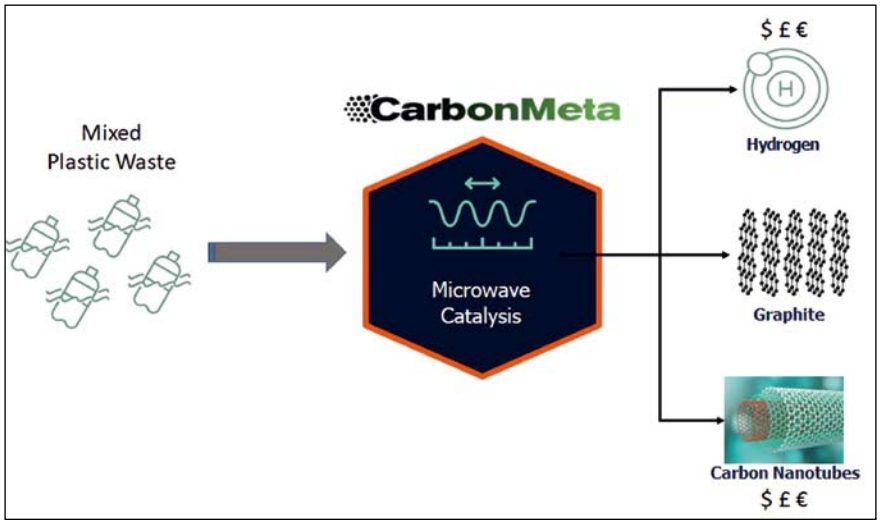
November 9 – 10, 2022, Hamburg (Germany)

According to the organizers, the 2022 edition of the conference will once again bring together key industry stakeholders from the renewables, fuels, energy and oil & gas industry including car manufacturers, e-fuel producers, technology providers, consultants and policy advisors. Senior-level speakers will present on technical aspects of the e-fuel market and present the latest challenges and opportunities that the industry brings, ACI (Active Communications International) announced. They will discuss "requested topics by industry experts, touching on aspects such as e-fuels in the automotive and aviation industry, e-fuel production costs challenges and the latest technological advances amongst others".

www.wplgroup.com/aci/event/european-e-fuels-conference/

UK: BREAKTHROUGH REGARDING "PLASTICS WASTE TO HYDROGEN"

Academics from the Universities of Oxford and Cardiff are working with CarbonMeta Research Ltd. to turn plastic waste into clean hydrogen fuel and carbon nanomaterials.



Source: CarbonMeta Technologies, Inc.

End of June, USA-based CarbonMeta Technologies Inc., a resource reclamation company that will process organic wastes, has announced that its British subsidiary, CarbonMeta Research Ltd., is commercializing a breakthrough technology named "microwave catalysis". The processing method stems from the University of Oxford. Now the firm is making plans to "process waste plastic at scale in custom-designed microwave machines, which will yield high-value products for the industry". As reported, one metric ton of plastic mixed with 200 kilograms of iron powder catalyst can selectively produce enough hydrogen to heat approximately 200 homes and can yield 900 kilograms of graphite and carbon nanotubes, which can be used to build battery technology for powering electric vehicles. "Transforming one ton of plastic using the technology can on average take two hours, with the material reaching temperatures of up to 600 degrees Celsius," the North American company informed.

Forging commercial partnerships

The company is building commercial partnerships to up-scale this technology, including global multi-energy providers in Europe. Its latest initiative is an assessment project in Spain, which will analyze how different combinations of mixed plastics waste perform in the new process, and how to generate the most substantial yields.

According to CarbonMeta Technologies, the company's mission is "to 'upcycle' plastic and construction waste to help address the world's burgeoning pollution and climate crises". Its technology would support "the transition to two major sources of sustainable energy – hydrogen for transport or to heat homes and batteries for electric vehicles".

The firm intends to develop a global reach predominantly based on this British innovation. As emphasized, Oxford Professor Peter Edwards, who is also a Fellow of the Royal Society, is the brains behind the process, having conducted over two decades of research in environmentally-focused chemistry. His other work includes using carbon dioxide to create aviation fuel and extracting green hydrogen from fossil fuels.

"The results of the European project will be published in the autumn of 2022, with further commercial partnerships expected to follow with global energy firms who could benefit from the technology," CarbonMeta Technologies announced.

www.carbonmetatech.com
www.carbonmetaresearch.co.uk

EUROPEAN BIOMASS TO POWER SUMMIT

November 9 – 10, 2022, London (UK)

ACI's 11th European Biomass to Power Summit will take place in London, UK. The two-day event will bring together key industry stakeholders from the biomass industry, Active Communications International, Inc (ACI), a firm for conference planning and production, is convinced. The organizers expect feedstock suppliers, biomass plant operators, end-product manufacturers, as well as technology providers – for two days of informative presentations, interactive discussion and networking opportunities. www.energy.ox.ac.uk/events/event/conference-european-biomass-to-power/

WELTEC BIOPOWER BUILDS BIOGAS PLANT IN TAIWAN

Construction is scheduled to begin in 2023; commissioning is planned for 2024. Together with its Asian partner Melchers Taiwan, the German manufacturer Weltec Biopower is building a biogas plant in the southwest of the island state. According to the company, it is its first biogas plant in the country.

Regarding the 360-kilowatt plant, the German biogas firm, which has realized facilities in many countries, is responsible for the engineering, the execution and the complete service including biological analyses. The construction at the operator's headquarters in Tainan City, on the southwest coast of Taiwan, is scheduled to begin in 2023; commissioning is planned for 2024. In addition to the electricity fed into the grid, part of it will be used for the plant's own use, Weltec described the exploitation of energy. "The heat from the biogas plant is also used to heat the operator's production facilities directly at the plant and via a local heating network: among other things, it is used to supply a pigsty that is equipped by WELTEC's parent company WEDA Dammann & Westerkamp. The circular economy concept envisages using the pig manure produced as the main substrate for the operation of the biogas plant." The stainless-steel fermenters would take into account the special requirements of the island state: due to its tectonic position, Taiwan experiences strong earthquakes with far-reaching consequences with above-average frequency. "The special stainless-steel construction and high stability of the biogas plant is adapted to the high earthquake probability and the local wind load specifications. Another advantage is that only a small amount of work is required for the on-site construction, as the project is intensively accompanied by the Weltec team."

As underlined, Taiwan aims for a climate-neutral economy by 2050. At the end of March 2022, this goal was published by the government in Taipei as part of a new roadmap. "The roadmap envisages billions of dollars in state investment for this project," the German biogas firm stated. "It is expected that especially already experienced market players such as Melchers Taiwan and Weltec Biopower will play an important role in this process and are eager to cooperate with the authorities to support the implementation path."

www.weltec-biopower.com

The Netherlands:

AVR AND HALOSEP COOPERATE

Dutch AVR has signed an agreement with Swedish HaloSep AB to explore the feasibility of locally recycling flue gas treatment material.

The company has decided to evaluate the possibilities to locally manage its hazardous flue gas cleaning residues through partnership with the Swedish firm HaloSep AB, a subsidiary of Stena Metall Group. Its process is a patented solution that turns the hazardous waste into harmless and useful fractions.

By choosing the HaloSep's solution, AVR in Rotterdam would become more circular by recovering material resources and reducing the plant's environmental footprint. The HaloSep turns the hazardous waste (fly ash and contaminated acid scrubber liquid) into three fractions: a metal fraction ready for recycling, purified salt brine that can be refined and re-used in the industry and a non-hazardous inorganic product that can be used in construction material.

www.halosep.com

GOAL: CLOSING THE LOOP ON POLYPROPYLENE

NEXTLOOPP is partnering with beauty company L'Oréal in its project to create food-grade PPristine and INRT-grade recycled Polypropylene (rPP) – a polymer developed for packaging that requires no odor and no migration challenges – from post-consumer packaging waste.

NEXTLOOPP is an award-winning project launched by Nextek Ltd in October 2020. The company recently hit the headlines with the results of their tracer-based sorting trials. Furthermore, it "recently commenced production trials of food-grade compliant rPP making over 60 different products from NEXTLOOPP's four grades of PPristine food compliant and INRT rPP grade resins," a press release said. "Using a combination of cutting-edge technologies, developed by Nextek Ltd, to first separate food-grade PP from the rest, and then decontaminate the polymer to ensure compliance with food-grade standards in the UK, EU and the USA, NEXTLOOPP is able to identify and sort any number of pack variants from shower gel bottles to yoghurt pots in any plastic type."

www.nextloopp.com
www.nextek.org

STORA ENSO AND NORTHVOLT WORK ON WOOD-BASED BATTERIES

Swedish-Finnish Stora Enso and Swedish Northvolt have entered into a Joint Development Agreement to create a sustainable battery featuring an anode produced using lignin-based hard carbon produced from Nordic forest wood.

The aim is to develop the world's first industrialized battery featuring anode sourced entirely from European raw materials, lowering both the carbon footprint and the cost. As reported, both companies bring key components, competence, and expertise to the battery partnership. Stora Enso will provide its lignin-based anode material Lignode, originating from sustainably managed forests, while Northvolt will drive cell design, production process development and scale-up of the technology. Stora Enso's pilot plant for bio-based carbon materials is located at the Group's Sunila production site in Finland, where lignin has been industrially produced since 2015. The annual lignin production capacity is 50,000 tons, making Stora Enso the largest kraft lignin producer in the world, the information said. The corporate group is also evaluating its first industrial production of Lignode at the Sunila site through a feasibility study.

Photo: Northvolt AB

www.northvolt.com
www.storaenso.com/en


Mauro Panizzolo

“WE DO NOT SELL MACHINES, BUT SOLUTIONS”

Mauro Panizzolo explains in an interview with GLOBAL RECYCLING, how the Italian company was able to interpret the needs of the metal recycling market.

The metal recovery sector is constantly evolving. On the one hand, increasingly complex scrap is generated; on the other hand, the market requires increasingly refined products to be reintroduced into the production cycle. In between is Panizzolo Recycling System, a company that has been able to courageously interpret the valorization of waste-containing metals, becoming a leader in the sector, in Europe and all over the world.

The owner Mauro Panizzolo, who since the 1980s has given a turning point to the family business – which was founded in 1946 – talks about the secrets and the hardships of a constantly growing business.

You changed the company’s direction. How did get from trading ferrous scrap to a full-service provider for metal recycling?

You arrive step by step, with constant attention to the customer needs and many investments in research and development. However, behind it all, there is a fundamental value, which is reputation. It is something that comes from the roots of the “scrap shops”, an ancient world in which respect, honesty and transparency are most important.

The second key point is to offer something that really serves the customer. We started with crushing: our first hammer mill dates back to the late 1980s and has been constantly perfected for over 30 years. Today we have a highly specialized and flexible shredder according to the needs and the type of scrap to be processed. The idea was to gradually complete the process, or rather to produce material from the waste that could be defined as a new product. From the grinding came a waste difficult to treat, with parts of copper, brass, aluminum, steel, glass, and cement dust. A

Photos: Panizzolo Recycling Systems

mix with little profitability, which often ended up in landfills or abroad. Precisely the closure of the borders for waste of a certain type was a great stimulus for us in offering our customers our new plant.

We have converted the mill in our headquarters in Pieve di Sacco, introducing a series of models in beta test. After two years of research, we have managed to bring the plant to perfection. We always start with hammer mills, mobile and stationary, which pulverize and granulate the scrap without exposing themselves too much to the wear and tear of glass and concrete. Once the material is pulverized, it becomes easier to separate the aggregates from the metals, by means of air and vibration, and then to distinguish by optical selection between metal and metal. In Bulgaria, last year, we worked with a company that carries out demolitions in Europe and which wanted a plant for the sorting of construction site scrap. We supplied them with the entire cycle: shredding, grinding, separation and refining, right up to the end of waste. This has generated value for them, in terms of image and profit, because they resell the recycled material.

What are the foundations of your technology?

The cradle is the fundamental element of our mill, easily removable, it allows external maintenance and quick change of the grids, guaranteeing the longevity of the machine. It is in fact the cradle that cushions, absorbs and manages shocks and stresses: its simplicity does not affect the performance of the machine, which has a very long durability.

Together with the mill we also supply those accessories and complements that make up the entire recycling solution. Belts, soundproof booths, metal separation systems, sieves, zigzags, densiometric tables and more are both made internally by us and in collaboration with highly qualified and certified partners. Our machines, if desired, close the cycle, but the customer can stop at the level he wants, from simple shredding to the complete plant.

The system is controlled by software that allows remote control and management via computer or smartphone. Although the machine is able to self-regulate the intensity of processing by itself, even for eight to ten hours. The software uses a standard base on which our system relies. Obviously, all in the context of Industry 4.0, which allows incentives and tax reliefs.

In recent years the company has grown exponentially, how did you manage the growth?

The positive trend started in 2014, with a fairly straight line. Since 2018, the straight line has become a vertical hyperbola, +25, +30, + 40 percent per year. In this growth we have had to meet the demands of the market, not only in numerical terms (more machines, more plants), but above all from a qualitative point of view, satisfying the requests of the individual customer and the demands of the market.

For this reason, company growth has been accompanied by more studying and training of personnel, at all levels, but also by a new structuring of roles and processes, in order to offer efficiency, quality and values to our customers. Then, of course, we invested in the structures: new equipment that boosted our productivity and a third location dedicated to the warehouse and service. The difficulty and commitment were great, but the satisfaction was equally important. Seeing the old customers, starting from our hammer mills, which grow and become international realities, thanks to the investments they continue to make with us – this is the best business card for new acquisitions.

What projects are planned for the near future?

This year we will proceed with a series of investments dedicated to the renovation of the historic headquarters in Piove di Sacco. During the year, we will install new upgrades in the machinery and, at the same time, we will improve the general appearance so as to make it a perfect showcase and test area for our customers. These are very demanding jobs, but we plan to finish them by the end of this year.

Another plus that characterizes us is the training offered to the customer. We are therefore structuring a sort of Academy capable of transferring skills to the customer before the installation of the system. When the plant is ready, it undergoes training in the field, with one of our ultra-specialized technicians.

This year we were at IFAT with a renewed stand. We presented ourselves from a more industrial perspective: an Italian company with an international vision and aesthetics, in line with our strategies. This trend will continue at Ecomondo, the other major European fair this year.

Looking ahead: What does the post-pandemic market hold? And how will Panizzolo deal with that?

I have the impression that the market in the metal recovery sector, in the last year, has been a bit drugged by the hammer blow of Covid, which first blocked and then relaunched the activities with an injection of incentives and concessions. The concern is that the situation is somewhat inflated and that the market may soon become saturated, with a slowdown and a physiological adjustment. Compared to other competitors, we have chosen to specialize in just one

sector. There is a good job potential and we are opening up to new markets, but we always keep our feet on the ground. We are not interested in selling a machine or a plant, but in selling a solution that can improve the work of companies. In fact, I think that achieving the objectives together with the customer is one of the things that gives us the most satisfaction. For us, a satisfied customer means a customer who is doing good business with our systems.

Mr. Panizzolo, thank you for this interview.

www.panizzolo.com

NEW INITIATIVE TO FOSTER RECOVERY OF PHOSPHORUS IN GERMANY

In June, the company EasyMining Germany informed that – together with several other companies – it has created an initiative "Sauberer Phosphor 2029" (Clean Phosphorus).

The initiative will work to champion and advocate for phosphorus recovery and recycling processes in Germany that are environmentally friendly and sustainable, the firm, which is owned by the Swedish environmental company Ragn-Sells, announced in a press release. Each member of the initiative would address either wastewater management or phosphorus recovery. "Nutrient recycling is essential but can only be considered if conducted in a sustainable way. This is why this initiative is so important," Christian Kabbe, CEO EasyMining Germany, was cited. Three things would matter when it comes to phosphorus recycling: quality, volume and reliability. As reported, the initiative relates directly to the German Sewage Sludge Ordinance, which was amended to begin requiring the recycling of phosphorus from sewage sludge ash in 2029.

Members of "Sauberer Phosphor 2029" are Gelsenwasser, MSE Mobile Schlammentwässerungs, PTC-Parforce-Technology Cooperation, Parforce Engineering and Consulting, KSR Klärschlammrecycling Bitterfeld-Wolfen, Phosphorgewinnung Schkopau and Ragn-Sells. In creating the initiative, the companies collaborated on a position paper, which "outlines seven agreed-upon qualities for clean phosphorus recovery".

According to the information, phosphorus recycling must be a process that

- can guarantee that the defined targets and intentions for phosphorus recovery in accordance with the Sewage Sludge Ordinance can be achieved;
- does not cause any additional accumulation of pollutants on fields, arable land, or cultivated areas;
- separates phosphorus recovery into product and residual material fractions in a manner that assures quality regardless of the composition and pollutant load of the starting material;
- fosters independence from the import of phosphorus through reliance on domestic sources;
- produces clean and universally applicable, marketable phosphorus products that are needed and further processed in the established structures of the phosphorus processing industry;
- removes the pollutant substances from the material cycle;
- enables separate recovery of as many valuable materials as possible from the ashes.

"These key positions will be featured prominently in public advocacy efforts by the initiative and its members," EasyMining, a part of the Swedish Ragn-Sells group, underlined.

Phosphorus is a vital ingredient in fertilizers and an essential additive for livestock feed. Its primary source is phosphate rock, a non-renewable resource that is mainly mined outside of Germany. "But new processes to recover phosphorus from incinerated sewage sludge are being developed and implemented into large-scale operations," the company informed. "Sewage sludge ash is not only a potential circular source of phosphorus but a domestic one as well."

www.easymining.se

BB ENGINEERING AT THE K SHOW 2022

As a sub-exhibitor of Oerlikon, BB Engineering will present itself as an expert in extrusion, mixing and filtration as well as an innovator for PET recycling at the K Trade Fair for Plastics and Rubber (19 – 26 October 2022, Hall 1, Booth 1D10) – and at the company's site in Remscheid.

Plastics competence – extruders, mixers, filters

BB Engineering is no newcomer to the plastics industry. As a joint venture of Brückner Maschinenbau (leading with film extrusion lines) and Oerlikon Barmag (leading with manmade fiber spinning lines), BB Engineering took over the extruder division of Oerlikon Barmag already in 2002. According to the company, it can thus draw on more than 60 years of experience in extruder construction and is constantly engaged in development work to optimize its products.

To date, approx. 20,000 extruders have been delivered worldwide, the German manufacturer informed. The machines are mainly used in film and synthetic fiber spinning lines for PP, PET, PA and PE. "BB Engineering is the exclusive supplier for its parent companies and also sells extrusion and filtration technology to third party customers." The portfolio also includes various continuous and discontinuous polymer filters from small to large (0.1 - 40 m^2 filter area) and various polymer mixers.

The quality of the melt and thus of the end product is the firm's priority for all components and equipment. According to Managing Director Dr. Klaus Schäfer, the company has always stood for high-quality, durable machines and components that enable its customers to manufacture first-class products. "A high-quality melt is crucial for trouble-free production and good, consistent product properties."

Recycling technology

BB Engineering has been focusing its development work increasingly on recycling technologies for several years. In addition to extruders, filters and mixers suitable for recycling processes and the processing of recyclate, the manufacturer offers a complete PET recycling plant called VacuFil. With this plant, the German engineering firm has also developed an "innovative and unique" PET LSP recycling process, which combines gentle large-scale filtration and targeted IV regulation "for consistently outstanding rPET melt quality". As reported, VacuFil processes a wide range of input materials – post-production and post-consumer. "The patented key component Visco+ vacuum filter removes volatile impurities quickly and reliably," the provider underlined. "VacuFil is a modular system that can be designed for different recycling applications. There are no limits to the downstream processes. Simple granulation is possible, but also direct feeding into further processing, e.g. in the synthetic fiber spinning mill. BBE offers VacuFil in combination with its own VarioFil compact spinning plant to produce polyester yarn."

Open House

During the K show this process will be presented at an open house of BB Engineering and Oerlikon Barmag. Not far from Düsseldorf, at the company's site in Remscheid, BBE and Oerlikon Barmag will open their doors and give customers and interested parties an insight into the technical center. Here, visitors can experience the VacuFil Visco+ recycling technology in operation with a connected VarioFil spinning plant and see how high-quality recycling yarn is produced from PET waste.

■ More information: Pia Kürten, Marketing, eMail: kuerten.pia@bbeng.de

www.bbeng.de/en/

UAE:

NEW BATTERY RECYCLING FACILITY

As reported by Arabic and Indian media, Royal Gulf Industries – a subsidiary of Hyderabad Castings and part of Indian Nakhat Group – will construct a battery recycling center in Ras Al Khaimah Economic Zone. The company would invest about 17 million US-Dollar (converted) to build the country's first environmentally safe automotive battery recycling facility. It is intended to be completed in the fourth quarter of this year. Royal Gulf Industries intends to recycle up to 35,000 metric tons of used lead acid batteries annually. That would generate 21,500 tons of lead ingots and 2,400 metric tons of plastic granules. Both materials shall be exported to India, Korea Japan, China, and Europe to produce new cases and lead acid batteries.

Norway:

TOM WILHELMSEN INVESTS IN NEW C&D RECYCLING PLANT

The soils wash plant will be the fourth C&D waste recycling plant in Norway engineered by CDE, a provider of wet processing equipment for recycling operations quarries, and mines on the global market.

Massebalanse Norge AS, the waste management division of Tom Wilhelmsen AS, is set to commission the new CDE waste recycling plant in Disenå in Norway's second largest county, Innlandet. It will realize an annual capacity of 350,000 tons, CDE informed, and was the latest deal to have been secured with strategic partner Nordic Bulk, an expert in bulk material processing plants. It comes as the family-owned and operated firm "is announced as an official climate partner in the city of Oslo, a certification which reflects its commitment to adopting sustainable practices to offset the environmental impact of its operations and that of the Norwegian materials processing and construction industries as a whole". In pursuit of that, the company has committed to establishing a zero emissions operation by 2025.

As reported, Tom Wilhelmsen AS became the first transport company in Norway to use fully electric tipper trucks for construction operations in 2020. Today, it would operate six Volvo FE Electric tipper trucks. "By 2023, it will double the size of its electric vehicle fleet as it responds to increasing demand for sustainably sourced and processed construction materials."

Fulfilling that demand will be CDE's state-of-the-art wash plant. With a processing capacity of up to 250 tons per hour, the plant will accept a variable feed of excavated and contaminated soils to produce a range of new, saleable sand and aggregate products for the construction industry.

Stian Wilhelmsen, Tom Wilhelmsen and Gilberto Enkerlin at CDE wash plant, Velde (from left to right)

In-spec end products, including soil, gravel and stone will have applications in cement production, roadworks and other construction, infrastructure and public works projects.

Much like its pledge to minimize noise pollution in the communities in which it operates through the rollout of an all-electric fleet of vehicles, the new CDE plant will be installed indoors in an existing 4,400 square meter unit in the Sør-Odal municipality. "The benefits of this approach are two-fold, as the indoor plant with exterior stockpiles means the plant can operate year-round and avoid costly downtime as a result of adverse weather conditions."

Material coming in to then be transported to future wash plants by electric trucks

Furthermore, Tom Wilhelmsen AS is currently exploring plans to commission a rail route between its C&D waste reception center in Oslo and the site of its new CDE wash plant, the information said. If approved, plans could see a significant reduction in road transportation as the company transitions to an electrified rail freight line to transport material some 65 kilometers to the processing site.

Groundworks were announced to begin this summer with a view to the plant being operational early next year.

www.cdegroup.com

Photos: CDE

SMS GROUP RECORDED HIGH LEVEL OF ORDER INTAKE

With an 86 percent increase, Germany-based SMS group almost doubled its order intake to reach 3,507 million Euro in the 2021 financial year, recording the highest level in ten years.

According to the company, the reasons for this substantial rise are catch-up effects in the wake of the previous year's slump triggered by the Covid-19 pandemic and the growing demand for decarbonization and recycling technologies.

For SMS group, the 2021 financial year closed with sales down 6.8 percent from the previous year at 2,559 million Euro. Earnings before taxes (EBT) amounted to 87 million Euro. "With this result, SMS has returned to a post-pandemic situation of profitable growth," the firm underlined. Personnel costs in Germany have been sustainably reduced by 75 million Euro as a result of the extension of the future-oriented collective agreement and socially acceptable staff reductions. The free cash flow rose significantly to a total of 145 million Euro. Net liquidity climbed to 978 million Euro. Investments were also higher than the year before, totaling 151 million Euro.

Decarbonization and circular economy

With the acquisition of the remaining shares of Paul Wurth in April 2021, SMS has further strengthened its position as technology partner and full-line supplier for the steel industry.

Furthermore, under the hashtag #turningmetalsgreen, SMS would not only supply solutions and systems to the steel industry but also develop technologies that "enable the recovery and reuse of nearly all types of metals". In November 2021, a long-term, strategic partnership agreement was concluded with copper producer Aurubis, covering the development and construction of several modular recycling plants in Europe and North America. "These modern multi-metal recycling plants will recover valuable metals, such as copper, nickel, tin, zinc, platinum and various precious metals, for reuse in the value creation cycle."

Demonstration plant Primobius for the recycling of li-ion batteries

As reported, the LIB (lithium-ion battery) recycling process from Primobius has secured its first commercial success. "After the start of commercial operation of the demonstration plant in Hilchenbach in spring 2022, Mercedes-Benz was one of the first customers to decide to use this process in its operations," SMS group gave account. "Primobius will be building its first industrial-scale plant at the Mercedes-Benz location in Kuppenheim (Baden-Württemberg), Germany."

Positive outlook

SMS expects a sustainable and perceptible increase in incoming orders and a marked improvement in results over the next few years. The order intake in 2022 is anticipated to level out at the previous year's figure, even because of the Russia-Ukraine war.

www.sms-group.com

Photo: SMS group

Advertorial:

New Sorting System:

WÜRZBURGER RECYCLING GMBH (WRG) KICKS OFF!

The challenge: design and install a new commercial waste sorting plant in a relatively small space in an existing hall.

The result: Europress Umwelttechnik accepted the challenge and successfully implemented the system within a short time!

Photo: EUROPRESS Umwelttechnik GmbH

"The development of the recommended solution, the project planning as well as the subsequent realization as a general contractor by the team of Europress Umwelttechnik GmbH led to the desired customer objective," the specialist in conveying, dosing, sorting, pressing and binding reported on the company's latest project. "The commercial waste sorting plant has started its service and convinces by trouble-free operation and the achievement of the desired sorting results of different volume flows."

Capacity performance:

- Average bulk density 230 kilogram/cubic meter (kg/m3)
- Throughput capacity 11 tons per hour (t/h)
- Ten sorting fractions

"We would like to thank Würzburger Recycling GmbH for the order and the trust they have placed in us and wish them every success in the future with their expanded range of services provided by the sorting plant."

www.europress-umwelttechnik.de/en/

ENVIRO INTENDS TO REALIZE TIRE RECYCLING FACILITY IN UDDEVALLA

Sweden-based company Scandinavian Enviro Systems has been granted an environmental permit for the planned recycling plant in Uddevalla (province Västra Götalands Län).

As the company previously has announced, the application pertained to the establishment of a recycling plant on an industrial site in the Lillesjö district of Uddevalla Municipality. The facility would have the capacity to process up to 60,000 tons per year, which would suffice for the recycling of more than 60 percent of Sweden's total annual volume of end-of-life tires. The

environmental permit application for the facility was filed in mid-November of last year.

"Our application has been handled swiftly, which is proof that we have established a solid process for preparing supporting documentation for environmental permit applications. Our ability to do this is essential for our continued expansion, since efficient permit processes are a critical success factor," Thomas Sörensson, CEO of Enviro, was cited.

A final decision on establishing the new plant depended on several factors, such as securing access to end-of-life tires and agreements covering deliveries of recovered materials.

www.envirosystems.se

Photo: Scandinavian Enviro Systems AB

RECYCLEYE FOUNDERS WIN "YOUNG INVENTORS PRIZE"

In June this year, the European Patent Office (EPO) honored Belgian entrepreneur Victor Dewulf (25) and British computer scientist Peter Hedley (27) with joint first place in the inaugural Young Inventors prize.

The two entrepreneurs – CEO Victor Dewulf and CTO Peter Hedley of the company Recycleye – have developed an intelligent recognition and sorting system that enables waste management facilities to quickly and accurately separate rubbish, ensuring that more is recycled, EPO informed. "Dewulf and Hedley's system consists of two parts, which can be used separately or together. The waste recognition system uses a cellphone-quality camera mounted above conveyor belts to take photos of the passing waste and send them to an algorithm, which ranks them for picking priority. Instructions on where to pick up and place the waste are then sent to a 6-axis robotic arm for sorting. The entire solution can make 55 successful picks from a conveyor belt every minute."

Victor Dewulf (Belgium) and Peter Hedley (UK)

The idea for Recycleye began when Victor visited a recycling facility as part of his degree, the UK-based company gave account. "He was surprised at the level of manual labor involved, making sorting waste prohibitively expensive and limiting the volume of recycled material. He suspected that a type of artificial intelligence called computer vision could improve the process and turned to his friend Peter Hedley to partner on the project."

As reported by EPO, the pair founded their company, Recycleye, in 2019. "They have since raised millions of Euro in funding and have so far deployed 17 vision systems and five robot arms, with more in the pipeline."

www.epo.org
www.recycleye.com

Photo: European Patent Office

Finland:

PILOT LINE FOR POST-CONSUMER TEXTILE RECYCLING

In July this year, Lounais-Suomen Jätehuolto (LSJH) in Paimio, has successfully started up a new Andritz pilot line for research and development work on post-consumer textile recycling.

The Exel tearing machine for post-consumer textile waste can process up to 500 kilograms per hour for spinning quality and up to one ton per hour for nonwoven fiber quality, as Austrian-based company Andritz gave account. "The entire process is designed to ensure the total absence of metallic material in the fibers and remove hard, non-textile items using cleaning devices, highly sensitive metal traps, and metal detectors."

The pilot line for textile recycling at the Lounais-Suomen Jätehuolto facility

Photo: Lounais-Suomen Jätehuolto, Andritz

LSJH is a municipal waste management company in Finland that specialized in processing post-consumer household textiles into a variety of customized raw materials containing high-quality fibers. "As Finland will be the first country in the world to start a post-consumer textile collection on a national scale in a few months' time, the LSJH Paimio recycling facility is the location where large amounts of textile waste will be fed to a sustainable and responsible circulatory solution," the provider of the pilot plant pointed out.

www.andritz.com

OFFTAKE AGREEMENT FOR RECYCLED STYRENE MONOMER

Indaver and Ineos Styrolution have signed an offtake agreement.

This agreement closes the loop towards a circular economy for polystyrene, Ineos Styrolution, an international leading firm in styrenics, emphasized. It would enable the company to produce polystyrene from recycled feedstock replacing styrene monomer made from fossil feedstock. For that purpose, Indaver (a leading player in the European waste industry) will give Ineos Styrolution access to styrene monomer produced from post-consumer waste at Indaver's planned depolymerization plant. This facility will be based in Antwerp, Belgium, and start production in 2024. According to the information, the recycled polystyrene will meet stringent food grade specifications.

Photo: Indaver

"The depolymerization technology allows to recycle polystyrene by converting it back into its building block, styrene monomer. Thanks to this process, the recycled material can meet the strict food contact standards. This significantly expands the possibilities for recycling, including polystyrene waste that could previously only be used for conversion into low-value applications."

www.indaver.com/en
www.ineos-styrolution.com

CIRCULAR PLASTIC RECYCLING: VTT SPINS OUT OLEFY

In August, the Technical Research Centre of Finland (VTT) has announced its plan to spin out a new company – Olefy Technologies.

According to the information, Olefy's patent-pending technology can extract over 70 percent virgin grade plastics and chemical raw materials components from plastic waste. "The new process can be done in a single step, majorly reducing the cost of plastic recycling and making recycling a preferred option for massive amounts of landfill-bound plastic waste that current methods are unable to process."

The Finnish research center pointed to the fact that today, only eight to ten percent of global plastics get recycled primarily through mechanical recycling. "However, only a limited share of plastic waste can be mechanically recycled. Furthermore, the resulting recycled plastic cannot be used in food packaging and pharma applications." The opportunity to get virgin quality plastic from previously unusable plastic waste would mean that with Olefy "it is economically viable to recycle most of the world's plastics with minimal sorting by consumers and businesses".

"Plastic waste is one of the five major global problems that VTT has strategically set itself to solve," Antti Vasara, CEO of VTT, was cited. "Olefy is a quantum leap in recycling that will change the way the world views plastic by making it truly circular and guiding us even faster towards carbon neutrality."

More than one benefit

As underlined, a major advantage of the virgin quality materials produced from the Olefy process enables plastic to be recycled an infinite number of times. "One of the problems with current recycling methods is that the quality degrades every time plastic is recycled. After several rounds of mechanical recycling, the quality becomes too poor, and the plastic is no longer usable and goes to a landfill. With the Olefy recycling process, the quality of the plastic is equal to virgin grade, so it can be recycled indefinitely and materials no longer need to end up in landfills," explained Matti Nieminen, Head of Technology at Olefy. "In essence, Olefy will make it possible for plastic to be a true part of the circular economy."

Matti Nieminen (left) and Timo Sokka (right) at the pilot plant

Photo: VTT

The company's new technology would eliminate the need for naphtha feedstock (a crude oil product normally needed for conventional plastic manufacturing) and is also able to produce enough energy for the process, VTT informed. "The economic benefits of having virgin grade components from recycled materials can completely change the dynamic of global oil consumption. Olefy will significantly reduce the need to use new oil for making plastic and maybe even create a new economic incentive to clean up plastic from land and water as it becomes a valued commodity."

The Olefy Technology

- Olefy is an industrial-scale technology capable of recycling even low-quality plastic waste in order to manufacture high-value virgin grade plastics.
- The Olefy process is based on gasification. It breaks plastic waste into olefins and other valuable hydrocarbons.
- Yield of material recycling is as high as 70 percent of the feedstock.
- The product molecules created with the Olefy process are equal to oil-based virgin olefins (pharma and food quality).
- The robust process is tolerant to contaminants in the feed. This means easier pretreatment of the feed before the Olefy processing.
- The process components are based on mature technology.
- Technology readiness level (TRL) 5.
- Eight patents are pending.

www.olefytech.com, www.vttresearch.com/en

Major consumer product companies have set ambitious targets for incorporating recycled plastic into their products as well as packages – a typical goal being 25 percent of their total packaging by 2025. Around the world, demand for sustainable and recycled plastics was higher than ever, VTT stated. Essentially, with the Olefy process, it would take the same amount of ethylene or propylene-based waste plastic as higher-cost naphtha feedstock to produce a ton of virgin-grade plastic material. At the same time, the process itself would lower the cost of production of recycled plastic so significantly" that it can lower the bar for global companies to use it as a higher percentage of recycled material in their products and packaging," the researchers are convinced.

"Demand for recycled plastics is growing much faster than the supply," Timo Sokka, Head of Business at Olefy, was quoted. "All major brand owners are committed to fighting climate change, and they are responding to consumers' growing concerns on waste accumulation by utilizing recycled materials in their products. Olefy responds perfectly to these challenges by making plastics recycling truly feasible on an industrial scale."

There is a further advantage. Olefy's new technologies – according to VTT – could economically open up "a new world and value for plastic waste" for industrial steam cracker operations. A steam cracker is a petrochemical plant that breaks down light hydrocarbons, such as ethane, propane, and light naphtha, to produce ethylene. "This technology enables direct parallel integration of the Olefy modules into existing steam cracker sites around the world to effectively produce virgin grade olefins, which are converted back to virgin grade plastics. Significantly lower capital expenditure requirements, accelerating market demand, and price premiums make these investments also very attractive for the steam cracker operators."

As reported, the working Olefy pilot is successfully running at VTT Bioruukki Pilot Centre in Espoo, Finland. In August, the company was discussing partnerships and negotiating with investors for scaling, business development, and licensing of the technology. The first industrial demonstration operation is expected to be operational by 2026.

MADAGASKAR – Enormous Natural Potential vs. Teething Troubles

"There are very few waste treatment facilities, such as incinerators that meet standards or sanitary landfills, and recycling activities are only at the beginning stage," an inventory report by the Organisation of the United Nations for Industrial Development assessed in 2017. There are some decrees regulating waste management, but "with the exception of a few sites ... with sanitary or controlled landfills, these waste management infrastructures are lacking in the other localities. The waste is deposited in wild dumps, which are for the most part ‚official dumps' for the districts." What can be done to manage the Malagasy waste effectively and sustainably?

In 2010, the Service Autonome de Maintenance de la Ville d' Antananarivo (SAMVA) was responsible for waste management and funded by a dedicated solid waste fee. The charge was tied to the property tax and the wastewater treatment fee; they were encashed by the electricity and water supply service company JIRAMA. As the collection rate of the solid waste fee was very low due to low property tax rates and JIRAMA refused to transfer the share, SAMVA turned out to be underfunded, underequipped and unable to provide a proper service. "A large portion of solid waste is thus disposed into illegal dumpsites or drainage channels", the French Development Agency (AFD) judged.

No selective waste collection

In the same year, the French agency granted two million Euro to the Government of Madagascar to launch a project of seven years duration to restore the Andralanitra landfill, the only one dedicated to Madagascar's capital Antananarivo. The aims were to limit leachate generation, improve the collection and exploitation of the landfill and prepare for the closing down of the landfill. The project – from July 2010 to June 2017 – was executed by collecting waste from 320 bins and transporting it with 35 rented trucks to Andranalitra. In 2016, 44 neighborhoods participated in precollection and a pilot project of composting was executed on the landfill to treat the organic fraction of the waste. However, in 2016, the people of Madagascar's capital Antananarivo generated about 500,000 tons of municipal solid waste, of which 261,186 tons respectively 53 percent were formally collected and disposed of. A "Solid Waste Management City Profile" of the Climate & Clean Air Coalition balanced: "There is no selective waste collection."

Several attempts to increase collection and treatment

Some trials were done to develop Malagasy waste management. In 2017 for example, a Malagasy association developed an experimental project of urban waste valorization in

Photos: alexlmx / stock.adobe.com

Mahajanga, the third biggest town in Madagascar: Tananamadio tried to manage the local garbage dump by recycling part of the urban waste into organic products of agricultural interest. Engineers without Borders from the Netherlands together with Mety were working on establishing a waste management enterprise by an initial pilot project, which focuses on a low-income area in Antananarivo: For the pilot phase, Mety focused on collecting and processing food waste from markets and small restaurants into good quality fertilizer or biogas. At least 60 percent of all households in Toliara/Tuléar were expected to be connected to a functioning waste management system by 2017 and the number of unsanitary landfills was cut into halves, the German Welthungerhilfe gave account. (But the three proposed localities for a landfill were rejected, financial difficulties occurred, and the people hesitated to work voluntarily.)

65 percent remaining uncollected

In Tulear, instead, the local startup Greentsika launched a household waste collection service using digital tools in 2017 to handle collection date and fee; the German Welthungerhilfe realized the transportation of waste to landfills. And by the end of 2020, a consortium of five French specialized actors called Apis Solution started a project to upgrade waste management in Antananarivo – including capacity building and modernization of the waste management and recovery system by integrated management of the value chain as well as the recovery of biogas and compost to generate recurrent revenues. In other words: "Increasing the capacities of the pre-collection, collection, and waste sorting all the way to waste recovery, and landfill rehabilitation." This seemed to be necessary at a certain point: In 2020, Engineers Without Borders still spoke of around 65 percent of waste remaining uncollected and 35 percent going to a landfill in Antananarivo. And the estimated volume of this landfill had meanwhile reached about 25 million tons.

Exports of waste and scrap are forbidden

In 2011, UNICEF found out that less than half of the municipal waste or rubbish produced in Madagascar each year was collected of which only 3.5 percent was composted, whilst the remaining 405,173 tons were dumped in landfills. The uncollected waste amounting to 419,000 tons per year was left untreated within the environment. A study by the Intergovernmental Oceanographic Commission and AFD in 2014 separated household waste into organic matter (60 percent), papers and cartons (13 percent), plastics (10 percent), glasses (4 percent), metals (2 percent) and others (11 percent). It also identified recyclable Malagasy waste per year comprising of 89,681 tons paper and cardboard, 68,985 tons of plastics, 13,797 tons of metal and 666 tons of tires. And there are several thousand tons of hazardous wastes like used mineral oils, batteries and accumulators, car batteries and refrigerants, ranging between about 7,000 and 500 tons. According to foreign trade marketing company GTAI (GermanyTrade and Invest), the export of waste and scrap, especially of aluminum and copper, is forbidden. So, what happens to Madagaskar's waste that is not landfilled?

Creation with pieces of paper

In fact, there is some paper recycling in Madagaskar. The Société de Production d'article Hygienique (Spah) in Antananarivo is a specialist on the production of toilet paper made exclusively of cellulosic cotton wool from recycled paper sources. The company – once as "Papmad" a factory with 10,000 employees – has an output of one ton of wholly recycled toilet paper every year. It could be more, but first of all toilet paper is imported predominantly from China and secondly, only around seven percent of the population uses toilet paper because of a population with too little access to adequate sanitation. Another company using recycled paper waste is Newpack, headquartered in the capital city of Antananarivo. Founded in 1989, the company switched over to resource efficiency in 2009 "and the recycling and sales of paper waste"; in 2011 it installed a paper waste recovery system and a new water treatment plant.

Meanwhile, even ink sludge is treated. Today, Newpack runs "a sustainable environment policy by recycling of paper waste and wastewater treatment". Admittedly, the production of paper packaging needs additional wood – FSC-certified. A small start-up named "Poti-taratasy Création" was born in 2016. The Malagasy name of the enterprise expresses the product: "Creation with pieces of paper". According to the Relief Services paper, the enterprise selling bags made of recycled paper, cardboard or leather lacks financial capital and is unable to increase production due to a lack of infrastructure.

"Millions of plastic bags removed"

According to a paper of the Climate and Clean Air Coalition published in 2016, there are several companies that recycle plastic. Sacoplast, for example, concentrates on the recovery of materials like LDPE, HPE and PP for the production of bags, sachets, buckets and self-locking pavers. So does Vitaplast, a manufacturer of recycled or non-recycled products, that even wanted to start PET bottle recycling in 2022. Madacompost in his own words "removes millions of plastic bags from the city" and produces interlocking pavers from the material. The industrial group Société Malgache de transformation du Plastique (SMTP) is known for treating LDPE, HDPE, PVC and PPE and using it to make pipes and tanks. A paper of the Catholic Relief Services

paper says that the company lacks materials for recycling, is confronted with too much waste sorting and possible investments are hampered by prices of raw materials and customs duties. The Societe d'Emballage de Madagascar (SEM) uses only a small percentage of recycled polypropylene to manufacture bags; the lack of investment breaks the possibility to use more recycled materials.

350 jobs in textile recycling

The Economic Development Board of Madagascar (EDBM) delivers additional information on textile recycling. One of the companies is Le Relais, the leader in France in the collection, sorting and recovery of textiles, but also present in Madagascar. The clothes sorting center Taratra based at Fianarantsoa has more than 100 employees and handles 350 tons of textiles per month. The center cooperates with Miezaka, bringing second-hand products to the market. According to EDBM, the company in Africa and Madagascar together created more than 350 jobs, recycles and exports between 2,000 and 3,500 tons per year, and only 15 percent of the collected textile end up as final waste. Another firm, high-quality brand Akanjo Madagascar, utilizes organic silk, recycled cashmere and dead materials in half of its collection's ready-to-wear and is the only Malagasy textile industry certified ISO 26000 with three stars. And Epsilon – even as a developer and manufacturer of workwears, sportswears and children garments to the European market – not only recycles wastewater physico-chemically, biologically and phytologically: The enterprise reuses plastic waste, scraps of fabric as well as paper and wood and runs several trials with sludge and ash, cord waste and a vermicomposting system in order to recycle its organic waste.

WEEE, Covid-masks and EcoBricks

Madagascar additionally shows some more recycling approaches to industrial waste management. A Waste Electrical and Electronic Equipment Centre has been started in 2018, together with a Kenyan WEEE company cooperating in the creation of innovative practices for waste management related to urban mining and stimulating greater awareness among the public for the need to safely manage electronic waste. In 2020, the JRA University Hospital's autoclave sterilized up to 210 kilograms of Covid-contaminated waste per day, 35 percent of the total waste treated. Four cycles were carried out daily for an appliance that would only run once every three days at usual times. The cement producer Holcim (Madagascar) S.A. had two production centers: an integrated plant with a capacity of producing 150,000 tons/year and a silo with a capacity of 180,000 tons/year. A study in 2019 tried to find the best mineralizer for that facility that could reduce the thermal energy expended in the formation of clinker while improving its quality. The aim of the research was "the promotion of Madagascar's industrial waste and natural materials as clinker mineralizers". But in 2021 Holcim agreed to sell the plant to to Cementis Océan Indien. Another initiative is Eco-Bricks, part of the Global Ecobrick Alliance, propagandizing EcoBrick as a PET plastic bottle filled with non-degradable waste and usable in building houses or the construction of a garden walls.

Lacks and obstacles

Following the before mentioned inventory report, in 2017, the Malagasy recycling industry took its first steps. "In fact, apart from a few large industrial units located in the Analamanga region, small businesses or associations carry out recycling activities, which, for the most part, are not yet registered in the formal system". An article on "Mapping of available recycling/waste management infrastructure in Madagascar" edited by the Catholic Relief Services in early 2022 also puts a damper on too big industrial recycling expectations. After examining the scale and the waste management activities of several of the companies mentioned above, the paper shows a "lack of financial capital" as the major problem and the "lack of personnel working in the industry" as the second barrier to establishing small private or NGO companies. Obstacles for larger and industrial companies are in particular the gap between sorting workforce and the collected waste, the problematic search for the right type of recyclable waste and its necessary quantity. And finally: "Legal framework for waste management is for the moment flawed which means that the private sector is not necessarily inclined to invest in the field."

Chemical use ...

On the other hand, more than 70 percent of the Madagascan inhabitants are involved in agriculture. So, the country

There is no law prohibiting or limiting foreign investment in the country, but many obstacles make investment difficult.

"has a large supply of organic materials and waste, coming mainly from the fruit industry", the EDBM underlines. If – as shown – 60 percent of household waste consists of organics, of which a minimal fraction is composted, there must be a large number of agricultural by-products to be treated. The French National Research Institute for Sustainable Development proposed the incorporation of products from biomass in special chemicals and inaugurated an "International Joint Research Project", investigating "chemical ecology", "green chemistry" and "industrial ecology" focused on the recovery of regional biomass, as well as "bioactive molecules" from Malagasy biodiversity between 2019 and 2021.

... or energetic use?

Already in 2016, the École polytechnique fédérale de Lausanne published a master thesis on the "valorization of organic waste through anaerobic digestion in a rural municipality of Madagascar". The feasibility study discovered the right size of 30-40 cubic meter for the plant, explained several fermentation modes, proposed sorting, grinding and pre-fermentation as pretreatment processes, and cleared up the different possibilities of the resulting biogas or digestate. Moreover, it suggested that the "ideal would be the combination of AD and composting to produce, besides the gas, solid biofertilizer for the farmers of the neighborhoods". The author concluded, that this method "is a good option as it brings a decentralized solution for the treatment of 70 percent of the MSW (and can be combined with composting if quantities of waste are too big)", especially as even the treatment of fecal sludge could be achieved. The potential was evaluated as huge, since "almost no rural municipalities in Madagascar have a waste management program, whereas it is part of their responsibilities". Thus, the implementation of anaerobic digestion plants in rural areas was seen as "theoretically a very good and suitable idea". But the implementation was considered "not so easy" because of high investment costs and the problem of sufficient gas production in poorer households.

A pleading for waste to energy

A group of Chinese researchers prefers another use of biomass. Ling Qin, Mengjun Wang, Jinfu Zhu, Yuhu Wei, Xintao Zhou, and Zheng showed in an article titled "Towards Circular Economy through Waste to Biomass Energy in Madagascar" in 2021 that the main form of biomass energy used in Madagascar is still wood and solid charcoal. Therefore, the Chinese researchers in their article pointed to the conversion of sources like farming residuals, animal wastes, forest wastes and urban or industrial organic waste to energy. They adverted to technologies like gasification, torrefaction or fermentation to produce biogas, bio coal briquette and ethanol fuel. Admittedly, the method of attaining biomass in Madagascar at the time must be considered as being in the earliest stage, not safe and unsustainable. But the study also alludes to financial and other support from China and Germany. In 2017 for example, China invested 71.20 million US-Dollar in Madagascar, "including a large portion in renewable energy industry", according to the Economic and Commercial Counsellor's Office of the Embassy of China in Madagascar. And the Regional Liquidity Support Facility (RLSF) fund – providing liquidity to independent power producers – was supported with 63.2 million US-Dollar from the German federal ministry for economic cooperation and development.

Biomass will play an underpart

There are two possibilities and offers to treat organic waste and residual products for the recovery of energy. The actual government is intent on stopping previous energy shortages by fostering energy and emission reduction programs. Hence, the Ministry of Water, Energy and Hydrocarbons is convinced that "Madagascar has considerable renewable energy resources (hydraulic, solar, wind, and biomass), while overall energy consumption remains very low" – i.e. 15 percent. Therefore, its "Investment Plan for renewable energy in Madagascar" includes the deployment of biomass as one strategy beneath other types of power. With a target of at least 75 percent renewable energy, the production "would be mainly based on hydroelectricity, but also on wind power, photovoltaic energy and biomass". But biomass and (organic) waste will only play a minor role: Electricity and lightning will mainly be enabled by a power generation mix consisting of 75 percent hydroelectricity, 15 percent thermal, five percent wind, and five percent solar. Cooking – now engendered by 70 percent improved firewood or coal – will access 100 percent of sustainable-source wood. Biomass will only and especially be applied for commercial and industrial thermal use: "60 percent of businesses and industries will adopt effective measures by hydrocarbon and biomass use, compared to the currently almost non-existent penetration rate." It is an open question, whether the burned "biomass" – at the moment mainly firewood with 68 percent and charcoal with ten percent – will really be treated applying organic "waste".

The statement of Lloyd Bank is short and harsh: "There is no law prohibiting or limiting foreign investment in the country, but many obstacles make investment difficult. Madagascar has enormous natural potential, but the poor and costly quality of infrastructure, limited access to credit and financial instruments, as well as the poor definition of property titles, are all obstacles to investment. Political instability and corruption have blocked all public investment and caused the departure of many investors."

AIK TECHNIK AG TO SUPPLY ACID FLY ASH WASHING SYSTEM FOR TUAS NEXUS INTEGRATED WASTE MANAGEMENT FACILITY (IWMF) IN SINGAPORE

AIK Technik AG, a plant engineering company based in Switzerland, has been awarded a contract by Keppel Seghers to supply the complete FAW (acid fly ash washing) plant in Singapore for Tuas Nexus IWMF (Phase 1).

Tuas Nexus is the world's first integrated waste and used water treatment facility, which was conceptualized from the ground up. It was initiated to reduce the environmental impact of waste and used water in Singapore.

Tuas Nexus IWMF is a flagship waste management facility of the National Environment Agency (NEA) in Singapore. When completed, Tuas Nexus IWMF will be the largest Waste-To-Energy facility of its kind in Singapore, with an incineration capacity of up to 5,800 tons of waste per day. Tuas Nexus IWMF can process over two million tons of waste per year, which can free up landfill space for non-incinerable waste and residual material at Semakau Landfill. It is expected to be operational in phases from 2025 onwards. The facility will set new standards in technology and innovation in residual waste treatment while recovering energy from waste.

AIK Technik AG has been contracted to build the FAW (acid fly ash washing) plant for Tuas Nexus IWMF (Phase 1) in 2021. The FAW plant will be an important part of the facility, which will help reducing the environmental impact of residual materials.

AIK Technik AG will be responsible for the planning and design of the entire FAW plant including candle filters and mercury separation in Singapore. That is an important step to ensure that the plant meets the highest standards and delivers reliable results to the operators.

We will supply two complete, parallel FAW plants to Keppel Seghers. These include the candle filters, mercury separation, ash handling, extraction, filtration, lime handling, washed ash transport and various buffer and pumping systems. A single FAW plant achieves a throughput of 4.7 tons of fly ash per hour. By using the AIK solution, Keppel Seghers can process fly ash in a more environmentally friendly manner, more efficiently and quickly. The redundancy provides security and allows for scheduled maintenance of the plant. The plant is designed in such a way that in the future, it may also be possible to recover raw materials such as zinc (FLUREC).

The challenges in this project are the tight space conditions of the plant. These had to be taken into account in the planning to find an optimal solution for the arrangement of the various components.

The whole project impresses with its size. Even the vacuum belt filters, at 320 centimeters, are thirty percent wider than the largest standard models and offer a filter area of 45 square meters. The large number of stacking tanks also allows for a more flexible operation and at the same time creates a larger buffer for intermediate storage.

We will also implement the detailed specifications so that the IWMF is fully tailored to Singapore's needs. By automating the plant, manpower will be used efficiently.

AIK Technik AG is a globally active plant manufacturer for environmental technology based in Switzerland. The company has the expertise of more than 30 years of experience in the planning, delivery and commissioning of plants for acid fly ash washing and other technologies in the field of recycling plants.

www.aiktechnik.ch/en

Photo: National Environment Agency NEA

GLOBAL WIRE AND CABLE RECYCLING MARKET TO GROW

According to a study by Transparency Market Research, the global wire and cable recycling market is forecast to reach a value of 30.5 billion US-Dollar by 2031.

As reported, players are investing heavily in R&D projects to develop next-gen technologies to achieve energy consumption optimization and reuse of insulating materials in the wire and cable industry. “The demand for wires and cables is estimated to increase in the electronics industry as they are considered an integral part of the industry,” the market research firm stated. Hence, companies engaged in the recycling and electronics industries were focusing on collaborations to adopt effective recycling practices and expand their scope in e-waste recycling activities.

Photo: O. Kürth

Increasing gap between the demand and supply ratio

Due to the massive application of non-ferrous metals in the power infrastructure development, the demand for these metals is rising in recent years, the company underlined. Hence, cable makers worldwide were experiencing an increasing gap between the demand and supply ratio. “Recycling of wires and cables is projected to work as one of the prominent techniques in order to cater to the ever-increasing demand for non-ferrous metals from the power infrastructure industry. This factor, in turn, is bolstering the global wire and cable recycling market.”

www.transparencymarketresearch.com/sample/sample.php?flag=B&rep_id=76872

Europe:

GEMINOR CALLS FOR BETTER UTILIZATION OF ITALIAN WASTE RESOURCES

Italy has a recycling rate of 51.4 percent, which is in line with EU standards. According to Michele Benvenuti, who works as Country Manager for Norwegian-based company Geminor in Italy, the country can contribute more to the EU waste balance and the circular economy.

On its homepage, Geminor was reporting that Italy produces about 30 million tons of household waste every year; close to 50 percent of this amount would go to landfill. Michele Benvenuti believes that to increase the recovery rate and find more sustainable deposits, Europe must utilize a lot more of the disposable Italian waste.

As reported, 65 million Italian nationals produced close to 500 kilograms of municipal solid waste (MSW) per person in 2020, referring to data from the Italian institute for environmental research, ISPRA. In addition, Italian businesses produced about 154 million tons of industrial waste. “In the same year, about 20 percent of the household waste went to landfill in Italy,” explained Michele Benvenuti. “In a European context this is a substantial share, but the landfill rate is in practice even higher.”

Almost 30 percent of Italian MSW were biologically treated, and a considerable part of this is not compostable and used in landfill operations, “which brings the total amount of landfilled waste closer to 50 percent. This just emphasizes the present challenge of Italian waste management, but also the potential”.

18 percent of Italian household waste would go to national WtE (waste to energy) plants, “and currently we only have 37 incineration (WtE) plants in operation, falling from 41 in the last few years,” Michele Benvenuti informed. The development of plants for efficient energy recovery had come to a halt, potentially bringing even more waste to landfill. “Thus, we lack capacity for energy recovery in Italy, and soon we will also lack capacity for landfill.”

Surplus market

The biggest importing countries for Italian RDF (refuse-derived fuel) are Germany, the Netherlands, and Spain, but also the WtE players in Scandinavia are gradually taking interest in Italian waste resources. Still, the total RDF export from Italy had been just 580,000 tons in 2020. In comparison, the biggest RDF and SRF (solid recovered fuel) exporter, England, had exported a total of over 1.6 million tons in the same year, Geminor wrote. Since establishing an office in Italy in May 2020, the company had assisted the market by exporting RDF, SRF and hazardous waste from Italy to other European countries in need of waste resources.

As underlined by Michele Benvenuti, the EU market is in need of secondary fuels with both high and low calorific value, as well as low-carbon bio-RDF. “We are now building streams to help convert Italian MSW into energy resources, and in time also new products through recycling,” he was quoted.

In order to increase the recovery rate and find a more sustainable offtake, he calls for better international utilization of Italian waste. “The process of making export efficient and reliable, and by this fully integrating Italy into the European waste market, will need

Train arriving at Landskrona in Sweden

Photo: Geminor

improved cooperation between producers, transporters, off-takers, waste managers and authorities. Italy can contribute to the EU waste balance and the circular economy, but needs to build both reputation and infrastructure to get there." Transportation and logistics from Italy currently were a challenge, "and the long distance to Northern Europe makes this transport more prone to increased prices. Better shipping capacity, more lorry drivers and an upgrade of railway infrastructure will help in the process of bringing more waste resources from Italy to other EU countries".

www.geminor.no/en

Covestro:
TWO FACILITIES FOR MECHANICAL RECYCLING IN ASIA

German-based Covestro AG is building the company's first dedicated mechanical recycling production line in Shanghai. Furthermore, it intends to repurpose a production line in Thailand.

The international active company's goal is to become fully circular. Therefore, in August this year, Covestro has announced plans to set up its first dedicated line for the mechanical recycling (MCR) of polycarbonates at its integrated site in Shanghai. "The new MCR line will address the growing demand for more sustainable solutions, in particular, with post-consumer-recycled (PCR) products, to be used primarily for the compounding step in the manufacture of electrical and electronic products, automotive applications, and consumer goods," the press release said. The line (investment: over 27 million Euro) would be capable of delivering more than 25,000 tons of high-quality polycarbonates and blends. The commission is planned for 2023. Overall, the company aims to be capable of delivering more than 60,000 tons of polycarbonates with recycled content in Asia Pacific per year until 2026.

Repurposing a compounding facility in Thailand

Covestro will also repurpose an existing compounding line at its Map Ta Phut site in Thailand into a plant for mechanical recycling. "The conversion of the plant is scheduled to be accomplished by the end of 2022 and continue to pave the way and meet market demand for polycarbonates from post-consumer recycled (PCR) content across multiple industries in the ASEAN region," the company announced. Based on the current forecast, the unit would supply up to 10 percent PCR-based product of its annual production volume by 2030. The two facilities in Shanghai and Map Ta Phut would boost Covestro's output of PCR polycarbonates Makrolon R and Bayblend R, which contain up to 75 percent recycled content, the manufacturer of polymer materials and their components underlined. These materials "can contribute to a carbon footprint reduction of up to 50 percent while meeting performance and eco-labels' requirements".

www.covestro.com

Groundbreaking ceremony for the new recycling line in Shanghai: (from left to right) Roman Wang (Vice President of Procurement Strategy, Process Excellence, Chief of Staff, Schneider Electric), Guopei Yang (Director of Body, Exterior, Interior, Human Horizons), Lily Wang, (President of Business Entity Engineering Plastics, Covestro), Dr. Yun Chen (Head of Covestro Integrated Site Shanghai), and Renqi Hu (Senior Manager of Center Lab, SAIC Motor)

Photo: Covestro

EUROPEAN PAPER RECYCLING AWARD FOR GERMAN RESEARCH PROJECT ENEWA

In the EnEWA research project, universities and industrial partners are developing a solution to recycle waste paper from lightweight packaging, residual waste and commercial waste.

The project has now received the highest award of the European Paper Recycling Council (EPRC) in Brussels in the category "Innovative Technologies and Research & Development"; the European Paper Recycling Award recognizes projects, initiatives and campaigns that contribute to European sustainability through activities supporting paper recycling.

In this project, funded by the German Federal Ministry of Economics and Climate Protection, the Institute for Anthropogenic Material Cycles at RWTH Aachen University collaborates with the University of Siegen and several industrial partners. The starting point for the research was the fact that "it has been possible to reduce energy consumption in paper production through technical optimization of plants and through significantly lower energy requirements in the

Photo: O. Kürth

reprocessing of recovered paper," the RWTH Aachen University pointed out. "Therefore, the use of recovered paper is an important basis for paper production. Nevertheless, around 20 percent of the paper produced is currently not returned to the recycling circuit and is instead mainly incinerated to generate energy."

To recycle this paper, the EnEWA research project – "Energy savings in paper production by opening up the value chains of recovered paper from light packaging (LVP), residual waste and commercial waste" – is developing a complex treatment process from dry-mechanical sorting, shredding and hygienization to use in paper production. "Thus, waste paper from light packaging, residual waste and commercial waste is also to be integrated into the sustainable circular economy. This could potentially save over 300,000 tons of CO_2 per year in Germany."

Initial analyses within the research project would show that 50 percent of the paper from the mixed waste streams investigated to date could also have been disposed of via separate waste paper collection, thus offering the potential for more resource-efficient handling. "The generated results will be used in the development of a sorting process for papers from mixed waste collections in order to be able to sort out the recyclable paper for reprocessing," the university gave account. In further steps, the knowledge generated would be incorporated into the future development of the minimum standard for packaging recycling.

www.rwth-aachen.de

STOP OF PRIMARY ALUMINUM PRODUCTION

Norsk Hydro's majority-owned Slovalco aluminum facility in Slovakia has decided to close the primary aluminum production at the plant in September this year. The international active industrial company headquartered in Norway was reporting that Slovalco's decision came in response to adverse framework conditions and high electricity prices, "which show no signs of improvement in the short term". The casthouse in Slovalco would continue its recycling operation, "serving customers in the region with 75,000 tons of recycled aluminum annually".

The decision to close primary production would affect 300 of Slovalco's full-time employees, in addition to a reduced need for services from contractors and suppliers in the region, Norsk Hydro informed. A process had started to assist affected employees.

Slovalco is a fully consolidated aluminum smelter in Hydro, owned 55.3 percent by the Norwegian-based firm and 44.7 percent by Penta Investments Group. Before closing the primary aluminum production, the Slovakian company had an annual production capacity of 175,000 tons of primary aluminum and a casthouse capacity of approximately 250,000 tons.

www.hydro.com/en

Paper Packaging Market:

PREDICTED GROWTH OF 4.1 PERCENT

Photo: Francesco Romeo / pixabay.com

According to a new report by Future Market Insights (FMI), the global paper packaging market is estimated to expand at a CAGR (compound annual growth rate) of 4.1 percent and reach 463.4 billion US-Dollar by 2028.

Future Market Insights suggests that the growing consumption of packaged food and consumer goods will boost the demand for paper packaging in the coming years. "Suitability of corrugated boxes, cartons, and paper bags to pack a large variety of products from different end-use industries such as electrical & electronics, food & beverages, healthcare, homecare, building & construction, and tobacco, will create enormous growth opportunities in the global paper packaging market." Considering the high-growth opportunities arising from the e-commerce industry and a large number of packaging applications of paper packaging formats, most of the manufacturers of paper packaging solutions in the developed, as well as developing economies, were planning to expand their production capacities. The South Asian paper packaging market is expected to increase at a CAGR of 5.9 percent over the forecast period, the Dubai-based provider of market intelligence and consulting services informed. East Asia's paper packaging market – which includes a country-level analysis for China, Japan, South Korea, and Rest of the East Asia – would represent the highest share in terms of value and is predicted to grow at a CAGR of 4.2 percent over the same period. "North America and Europe are going steady, as they are giving a second thought to opt for 100 percent paper to save on deforestation," FMI stated. "Africa could still boast of dense forests. The paper packaging thing hasn't reached it completely as yet."

www.futuremarketinsights.com/reports/paper-packaging-market

Australia:

NEW CONSTRUCTION WASTE PROCESSING FACILITY WITH LATEST TECHNOLOGY

Photo: Turmec

Turmec, an international provider of waste processing and recycling solutions, has been awarded a 30 million Euro contract to design, build and install a state-of-the-art construction waste processing solution for Australian company Rino Recycling at its Pinkenba facility near Brisbane (Queensland).

According to Ireland-based Turmec, the new project will be one of the largest construction and demolition (C&D) waste recovery sites in Australia, designed to achieve market-leading landfill diversion and recovery rates of up to 99 percent and with a processing capacity of 475 tons per hour. The recovered C&D materials would be recycled into a range of high-quality sand, fill, road bases and aggregate materials, which will be supplied back into new construction projects.

The Pinkenba project forms part of a multi-million Australian dollar capital investment program by Rino Recycling to meet the growing demand for materials recovery and recycling in South East Queensland, Turmec informed. “This comes on the back of Australian government environmental regulations to support increased recovery rates and diversion from landfill, including a new landfill levy in Queensland, which is planned to increase annually. Significant growth in construction activities as part of a 25-year development plan for the region is also driving recycling demand for waste construction materials, including major transportation, port and waterfront development and leisure facilities in and around Brisbane. High levels of construction activities are expected to continue in preparation for Olympic Games which will be hosted by Brisbane in 2032.” The company‘s project partners – Northern Ireland group CDE – would be providing the materials wet processing elements of the project.

As reported, Turmec has delivered a major waste construction materials processing facility for Bingo Industries at Eastern Creek outside Sydney in 2021. The company is currently progressing waste processing and recycling projects in Ireland, the United Kingdom and Australia.

www.turmec.com
www.rinorecycling.com.au

ALL4PACK EMBALLAGE PARIS 2022

November 21 – 24, 2022, Paris (France)

Under the slogan “Lead the Revolution!” ALL4PACK Emballage Paris is offering four days of free conferences from November 21 to 24, 2022. According to the organizers, this is a unique opportunity to come and listen to high-level professionals sharing their experiences and vision. The conferences will follow an exceptional program and take place every day from 10:30 a.m. to 5:30 p.m. They will be linked to the sector’s challenges while helping to understand, analyze, decipher and discuss the packaging revolution – its trends, current and future solutions, as well as regulations and new standards. A preliminary conference program (including also recycling) has already been published.

www.all4pack.com

SWISS SOLUTION FOR END-OF-LIFE TIRES

Swiss company Tyre Recycling Solutions SA (TRS) will use the compounding technology of Swiss manufacturer BUSS to transform powder products obtained from recycled end-of-life tires into compounds at an industrial scale.

According to TRS, its performance materials – which require a specific, proprietary compounding process of TPE (Thermoplastic elastomers) and TPU (Thermoplastic polyurethane) based resins with recycled rubber powder – "bring a truly green transformation to a wide range of applications – from gaskets, logistics, automotive and construction industry to footwear and 3D printing".

After extensive market and technology research, the company chose the COMPEO compounding technology from BUSS for its "unique combination of powerful, low shear mixing with a conical discharge pump (CDP) unit for pressure build-up". As reported, the manufacturer's technical expertise in the handling of elastomers and the possibility of pilot scale production campaigns at its Campus in Pratteln has helped Tyre Recycling Solution with the development and evaluation of its new products until the commissioning of its own compounding plant in early 2022.

Tyre Recycling Solutions will use BUSS' Compeo compounding technology to transform end-of-life tires into compounds

Photo: O. Kürth

"Both companies are working closely together to grow the product platform globally and install further compounding plants within the TRS licensing universe," a press release informed. "The successful implementation of this ground-breaking innovation represents a true, ecologically sound solution to remove the >1.5 billion scrap tires discarded every year worldwide. In some countries, scrap tires still end up in landfills and are often burnt, creating toxic smoke and contaminants leeching into the environment. By compounding the powder from waste car and truck tires obtained by TRS technology into TPE/TPU resins, not only the tire waste is recycled, but performant sustainable materials are generated which add value in a wide range of applications."

- www.busscorp.com
- www.trs-ch.com/en

AWARD FOR INNOVATIVE USE OF WASTE RUBBER FROM CAR TIRES

Polish company ML Polyolefins was recognized – together with its partners – with an award for regranulate with a rubber filling.

Photo: ML Polyolefins

During the International Fair for Plastics and Rubber Processing PLASTPOL, which took place in May, the winners were presented. The award in the category "Plastics Processing Technologies" went to ML Polyolefins together with the following partners: Bydgoszcz Industrial Cluster Tool Valley, Bydgoszcz University of Science and Technology and Technische Universitat Chemnitz. They developed a technology for the secondary use of polypropylene film waste granulate and rubber from car tires in large-scale products like grass grids. As reported, the project involved using homogeneous tire rubber powder with a grain size of fewer than 0.5 millimeters as a filler for polypropylene regranulate. The prepared rPP-GTR composition was the input for the injection molding process. "The difficulty was that the compound contained a minimum of 50 percent rubber filler. Thorough research into the technical parameters of the material allowed the injection mold to be made and adapted," Professor Dariusz Sykutera, Bydgoszcz University of Science and Technology, was quoted.

The entity linking the participants and leading the work was the Bydgoszcz Industrial Cluster Tool Valley. The project was supervised by the Bydgoszcz University of Science and Technology, which also invited specialists from the Professorship of Lightweight Structures/Polymer Technology in Chemnitz. The implementation of the technology and the use of the developed compound in the final product were the part of the business partner ML Polyolefins.

www.mlpolyolefins.com/en/

USA: AQUA METALS TO SUPPLY LITHIUM HYDROXIDE TO DRAGONFLY

Aqua Metals, Inc., an innovator in metals recycling with its AquaRefining technology, and Dragonfly Energy Corporation, a leading manufacturer of deep-cycle lithium-ion batteries, have announced they have entered into a non-binding letter of intent (LOI) for Aqua Metals to supply lithium hydroxide to Dragonfly. Under the LOI, Dragonfly would purchase commercial quantities of lithium hydroxide from Aqua Metals to support Dragonfly's ongoing development of its solid-state lithium-ion battery technologies and future manufacturing activities, as well as providing recycling services. Dragonfly expects to begin production of its solid-state pilot line in 2023, with a supply of lithium hydroxide from its partner to commence at the time of full-scale manufacturing.

www.aquametals.com
www.dragonflyenergy.com

ONE-STOP POLICY SHOP WITH SOLUTIONS TO END PLASTIC POLLUTION

In July, the University of Portsmouth announced a new resource to help tackle plastic pollution on land and in the ocean.

As reported, the Global Plastics Policy Centre (GPPC) online platform is the latest development from the University of Portsmouth's Revolution Plastics research initiative. "Free to all, it is a 'one-stop shop' of independent, evidence-based advice on plastic policy," the university informed. "The new website is a knowledge sharing platform that comes under the GPPC umbrella, which was launched by Revolution Plastics at COP26."

The website "is designed to give governments and businesses the evidence needed to make informed, evidence-based decisions around plastic policies," the university gave account. It was also aimed at giving citizens the knowledge to understand the actions their governments are taking. "It will ultimately increase the accountability of policymakers in both government and businesses by identifying strengths and weaknesses of plastic policy action." At the heart of the website is an analysis of more than 100 plastic policies from around the world that have been analyzed for effectiveness by researchers. These include policies such as national bans; taxes and/or levies on plastic products; consumer behavior campaigns; recycling and waste management strategies; private sector initiatives, business model adaptation, and increasing producer responsibility. The initial analysis is just the start and will be supplemented with additional evidence and advice as further studies are completed. This research was supported by the Flotilla Foundation, a registered charity with a mission to enhance mankind's relationship with the marine environment.

www.plasticspolicy.port.ac.uk

CIRCULAR RESOURCES SARL ACQUIRES GERMANY'S GREEN DOT

The aim is to create an integrated mechanical and chemical recycling solution for plastic packaging waste.

Luxembourgian Circular Resources Sàrl, a company established to provide a one-stop-shop for the recycling of plastic waste, has acquired Germany-based DSD – Duales System Holding GmbH & Co. KG and the group of companies with "Der Grüne Punkt" (or the "Green Dot") with effect from August 10, 2022. The companies acquired include one of the leading dual systems for collecting and recycling used sales packaging in Germany as well as two companies (Systec Plastics), which produce recyclates from plastic waste collected by Der Grüne Punkt – Duales System Deutschland GmbH. "The acquisition of Der Grüne Punkt by Circular Resources is a milestone for closed-loop recycling. Circular Resources will fully support Der Grüne Punkt's current licensing, waste collection and mechanical recycling businesses, which are performing very strongly, and complement this by introducing large-scale chemical recycling of waste plastics in Germany," Founder and President of Circular Resources, Carlos Monreal, is cited. He is also the founder and CEO of Plastic Energy, a global leader in the chemical recycling of end-of-life plastic waste. According to the information, the deal is expected to unlock further synergies between mechanical and chemical recycling of plastic waste in Europe "that will allow plastics currently being lost from the value chain to be brought back into the recycling loop".

www.gruener-punkt.de/en/

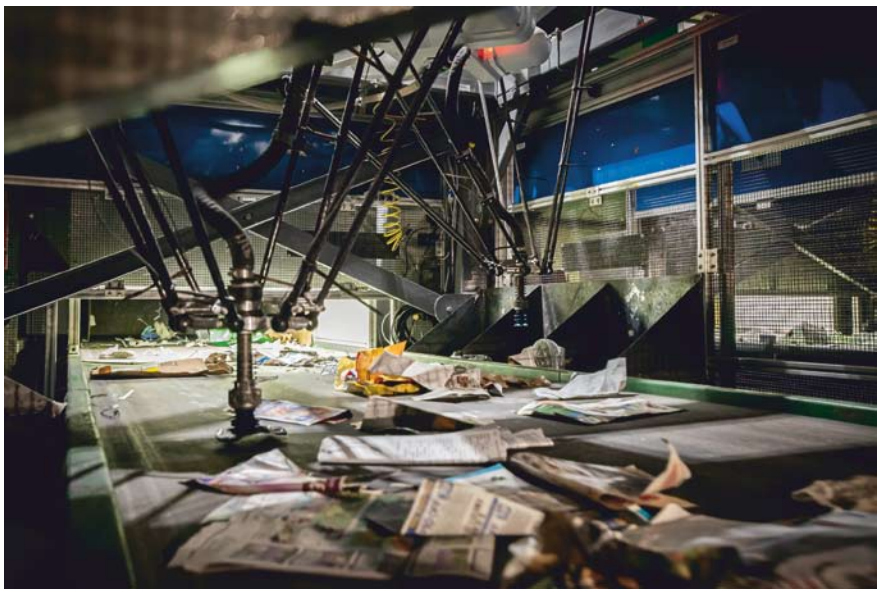
Foto: DSD

BRINGING RECYCLING INTO THE FOURTH INDUSTRIAL REVOLUTION

Just because something is recyclable does not automatically mean it is recycled. However, AMP Robotics wants to change that. Their application of artificial intelligence (AI) can be used to identify and recover recyclables with rates of speed and precision previously unknown to the industry. GLOBAL RECYCLING Magazine wanted to learn more about the American company that helps businesses, governments, and NGOs achieve higher recycling rates and supply greater volumes of post-consumer recycled content.

AMP has announced its European expansion. What services do you offer in Europe?

AMP provides a portfolio of recycling solutions powered by our industry-leading neural network, which is built on a data engine that has recognized more than 50 billion containers and packaging types in real-world conditions. AMP Cortex is our high-speed robotic sorting system with approximately 230 deployments in more than 80 facilities across three continents. Our install base is the largest known fleet of recycling robots in the world, creating the most expansive neural network of field data for recycled materials. AMP Vision is a modular computer vision system that helps operators understand material flow throughout key stages of sorting operations and serves as a quick and efficient alternative to manual sampling audits. When integrated with AMP Clarity, our material characterization and robot performance software solution, users can monitor real-time material characterization and performance measurement throughout a facility. And we recently introduced new Clarity features including mass estimation; robot pick assignments, alerts, and status tracking; and expanded reporting capabilities.



We have grown our European team to include Direct Sales, Marketing, Post sales, Service and Maintenance. Our initial focus was on serving Austria, Belgium, France, Germany, Luxembourg, The Netherlands, and Switzerland, along with the UK and Ireland, but the interest in our AI material recognition systems as well as AI-powered robotic pickers grew so significantly that we are now covering all European countries. AMP Robotics‘ main goal remains the continuous support and close collaboration with its customers. While we expanded our territories, our commitment to work hand in hand with our customers to improve their material recovery rate is our priority.

Are new projects scheduled at the present time in Europe? Can you tell us more?

We‘re engaged with a number of major players in the recycling industry across Europe both for AI recognition vision systems and our robotic picking

Photos: AMP Robotics

system. We've had some successful deployments in Europe, including FCC in Spain and Recyco in Northern Ireland, and we're very excited about the upcoming projects our team will take on in the coming months. Due to confidentiality clauses, we, unfortunately, can't share more details at this moment.

When will the planned installations go into operation?

Mostly in Q4 2022.

Which projects and solutions in the waste and recycling field are you currently developing for the European market?

We are continuously expanding the number of labels recognized by our AI neural network. Our AI platform, AMP Neuron, continues to achieve breakthroughs in data accuracy and classification of different polymers, form factors, and other packaging types, which is helping our customers take a more data-driven approach to increasing recovery, lowering costs, and optimizing operations.

We are also continuing to innovate our AI capabilities to identify and recover film and flexible packaging, which create operational challenges for MRFs and historically have been complicated to recover and expensive to reprocess into raw materials.

What are your longer-term plans for the future?

As we continue to scale our business and innovate new ways to improve the economics of recycling, we are committed to the European market and our growing customer base there. Our efforts to modernize Europe's recycling infrastructure are important to our global investors and critical to realizing our vision of a world without waste. Our goal is to establish AMP as the global market leader for AI, robotics, and material characterization systems. In the mid-term, we are evaluating the introduction of our own production facility in Europe while we continue to expand our local team.

www.amprobotics.com

HOW PICVISA USES HYPERSPECTRAL VISION FOR TEXTILE'S RECYCLING

2025 is the key year. By then, all countries of the European Union will have to manage 100 percent of their textile waste, more than 16 million tons per year, as established by the European directives on textile recycling and waste management adopted in 2018. Technology takes a leading role in the automated classification of textile waste to make this challenge a reality. A technology based on the so-called hyperspectral vision, which allows a greater recovery of value through an automated separation of materials.

Automated sorting of textile waste

But what exactly is hyperspectral vision? This solution combines two different technologies. On the one hand, computer vision, which captures images of the real world, processes and analyzes them. On the other hand, infrared spectroscopy (NIR) allows to identify the composition of textile products, since each fabric has spectral characteristics that can be used for its classification. Textile fabrics are based on three types of fibers (natural, artificial and synthetic), with differentiated chemical and molecular structures that react differently to electromagnetic waves.

This technology, based on the classification of fibers by composition and color thanks to the use of infrared spectroscopy (NIR), is already widely used in automated sorting in other segments, such as PET recycling. In this sense, a key to the success of automated sorting technology will be the treatment of large volumes of textile waste. Something that Picvisa is already implementing, in this case, with an installation for Coleo Recycling in A Coruña, Galicia.

Artificial intelligence and artificial vision

In pursuit of the automation of the classification and separation of textile waste, Picvisa develops technological solutions based on artificial intelligence and artificial vision, such as the Ecosort Textile optical separator that, adding NIR technology and side blowing technology, allows to classify and automatically separate several types of textile waste, by composition (cotton, polyester, viscose and other fibers), color or shape.

On the other hand, Picvisa has developed a software that detects garments by their chemical composition and color and an automatic separation system in specific containers that allows classifying up to 24 different combinations of textile materials and colors simutaneously for the textile recycling company Coleo Recycling. Thanks to the technological solution implemented by Picvisa, Coleo Recycling classifies and traces some 5,000 tons of textile waste annually. However, the great challenge of textile recycling remains: the coexistence of different types of fiber in the same fabric. This coexistence makes post-consumer textile recycling, with tons of clothes of fibers mixed, more complicated than pre-consumer recycling, when it is easier to know the exact composition of a fabric and how to recycle it. The solution involves regulating the manufacture of garments through eco-design to limit the casuistry, and the development of processes, such as the manufacture of new fibers from recycled waste, which make the textile industry a circular economy.

More recycling, more sustainability

There is no doubt that the recycling of textile waste is a key element in reducing the huge carbon footprint of the industries that generate this type of waste. The reduction in environmental impact associated with using recycled fibers is impressive. In some projects, the energy savings of recycled

Photos: Picvisa

versus virgin fiber can be 53 percent, while water savings can amount to 99 percent and chemical savings to 88 percent. Important percentages if one takes into account, for example, that the manufacture of one kilo of polyester fiber consumes 108 kilowatts/hour (kW/h) and 21 liters of water and emits 3.3 kilos of carbon dioxide.

To generate these percentages of energy efficiency it is necessary, however, to improve the recycling process of textile waste, with new selective collection systems, and, especially, with the improvement of the processes of selection and classification of this waste. Therefore, technological innovation is absolutely essential when it comes to optimizing these textile waste recycling processes. In this sense, textile recycling is emerging, without a doubt, as the first and fundamental step to get the second most polluting industry on the planet to begin its transition to sustainability. And this is where hyperspectral vision comes into play.

www.picvisa.com/en/
www.youtube.com/watch?v=ahssWSgLHyw

INDUSTRIAL WASTEWATER TREATMENT WITH INDUSTRY 4.0

According to German provider H2O GmbH, VACUDEST vacuum distillation systems ensure the safe separation of substances in wastewater from the chemical/pharmaceutical industry.

The internationally active company has further developed its VACUDEST vacuum distillation systems for treating wastewater from the chemical-pharmaceutical industry, and has presented the first wastewater treatment system with access to Industrie 4.0 at the trade show ACHEMA in Frankfurt in August this year.

The system with the new "Smart Service Cockpits" would provide users with a new quality of process monitoring for wastewater treatment directly on the machine control, H2O emphasized in a press release. "The term 'Industrial Internet of Things' (IIoT) refers to the process of collecting huge amounts of data from intelligently networked machines in the industry. Those who evaluate, understand and efficiently use this data benefit from a continuous optimization cycle and thus from high system availability and optimum machine performance with less wear." For the VACUDEST vacuum distillation systems, this would mean that users not only get an overview of the performance of their water treatment. "Through the permanent condition monitoring and the continuous optimization suggestions, a long-lasting high system availability with maximum machine efficiency and less downtime can be achieved through predictive maintenance. The result: more process reliability, lower operating costs, less stress." As reported, vacuum distillation systems use the principle of physical substance separation according to boiling point differences. Thus, active pharmaceutical ingredients (API), medicines, hormones, trace substances, pesticide effluents, native oils, emulsifiers, and other substances remain in the evaporation residue – and are safely separated thanks to technologies from H2O GmbH such as the Clearcat condensation stage. "In one treatment step, up to 98 percent reusable water is produced from 100 percent wastewater." Due to these savings, the investment in a vacuum distillation system usually would pay for itself in less than two years.

Photo: H2O GmbH

www.h2o-de.com/en/

Recycling Mixed Plastics:

METHOD WITHOUT CLIMATE IMPACT

According to Swedish Chalmers University of Technology, its recycling method could decouple new plastic products from the supply of new fossil raw materials.

As reported, researchers at Chalmers have demonstrated in a study how the carbon atoms in mixed waste can replace all fossil raw materials in the production of new plastic. "The recycling method is inspired by the natural carbon cycle and could eliminate the climate impact of plastic materials, or even clean the air of carbon dioxide," the university gave account.

"There are enough carbon atoms in waste to meet the needs of all global plastic production. Using these atoms, we can decouple new plastic products from the supply of virgin fossil raw materials. If the process is powered by renewable energy, we also get plastic products with more than 95 percent lower climate impact than those produced today, which effectively means negative emissions for the entire system," Henrik Thunman, Professor of Energy Technology at Chalmers University of Technology, is cited. He and his research team want to focus on the carbon atoms in waste, which is currently incinerated or ends up in landfills instead of being recycled. According to the information, this is made possible with technologies targeting the carbon contained in plastic, paper and wood waste to create raw material for the production of plastics with the same variety and quality as those currently produced from fossil raw materials.

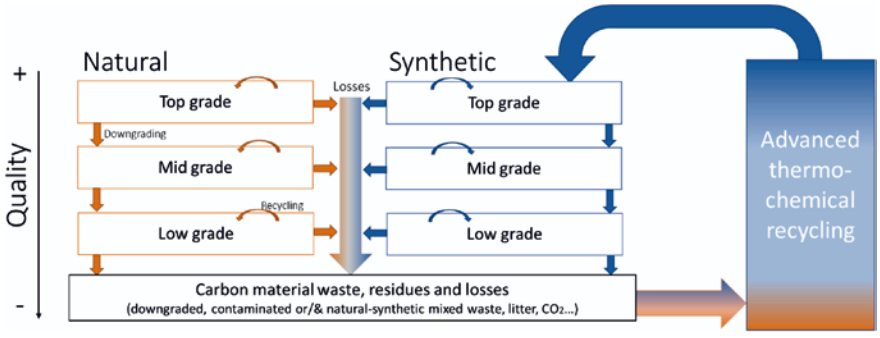
Advanced methods

Current plastic recycling methods are able to replace no more than 15 to 20 percent of the fossil raw material needed to meet society's demand for plastic. "The advanced methods proposed by the researchers are based on thermochemical technologies and involve the waste being heated to 600-800 degrees Celsius. The waste then turns into a gas, which after the addition of hydrogen can replace the building blocks of plastics. Using this recycling method could decouple new plastic products from the supply of new fossil raw materials," the university described the process. The researchers were developing a thermochemical recycling method that produces a gas, which could then be used as a raw material in the same factories in which plastic products are currently being made from fossil oil or gas.

Different types of waste, such as old plastic products and paper cups – with or without food residues – were put into the reactors at the Chalmers Power Central. "The key to more extensive recycling is to look at residual waste in a whole new way: as a raw material full of useful carbon atoms. The waste then acquires value, and you can create economic structures to collect and use the material as a raw material worldwide," Henrik Thunman was quoted. According to the researchers' calculations, the energy to power such processes can be taken from renewable sources.

The research has been carried out as part of the FUTNERC project, funded half by the Swedish Energy Agency and 25 percent each by the companies Borealis and Preem Petroleum AB. It aims to accelerate the transformation of the chemical industry to achieve net-zero greenhouse gas emissions from refineries and chemical plants by 2050. The study "Co-recycling of natural and synthetic carbon materials for a sustainable circular economy" (🌐 www.sciencedirect.com/science/article/pii/S0959652622022739?via%3Dihub) was published in the Journal of Cleaner Production. Authors are Isabel Cañete Vela, Teresa Berdugo Vilches, Göran Berndes, Filip Johnsson and Henrik Thunman. The researchers are active at Chalmers University of Technology.

🌐 www.chalmers.se/en



Current downgrading schemes and losses associated with recycling of C-materials (left-hand side) and proposed use of advanced thermochemical recycling to produce high-value C-materials (right-hand side)

Source: Study "Co-recycling of natural and synthetic carbon materials for a sustainable circular economy"

ProDIGIT:

SOFTWARE TO OPTIMIZE WASTE TREATMENT

With its ProDIGIT operating software, the internationally active Sutco RecyclingTechnik GmbH is optimizing the market for sorting and processing plants in the recycling sector.

As reported, the ProDIGIT software offers operators of sorting plants material flow-optimized waste treatment, significantly increasing the efficiency of their various plant components. “The software uses data from material detection and process parameters,” Sutco informed. “Data from Sutco bunker management are used in addition. This ensures predictive bunker discharge, avoiding the occurrence of unwanted simultaneities here. Sorting plant shutdowns are prevented and availability and throughput markedly increased. This is made possible using simulation and intelligent prioritization.”

The simulation would also ensure that, in the bunkers, the material quantity needed for consistent bale production is drawn at the right point into the bale press. The result: every bale is of the desired weight and length. Additionally, the energy consumption of the bunker press system is optimized, fuel is saved and machine technology conserved. According to Sutco, this leads to lower maintenance and repair costs. “The increased level of automation in the waste sorting process allowed by the new ProDIGIT software improves the plant’s efficiency and increases throughput while achieving the best possible output quality results,” the company underlined. The software is already being used successfully in plants and is constantly being further developed by Sutco’s internal R&D department. “Features for the best possible operational support, such as the function to determine optimal maintenance intervals that are adapted to the actual level of wear, are currently being developed.”

www.sutco.de

Photo: Sutco

THE NEW 340 G TELEHANDLER – A COMPACT MACHINE FOR LARGE TASKS

Developed for use as a telehandler and powerful multi-function machine, the 340 G was added to the Sennebogen Multi Line in spring 2022. The new 4-ton machine impresses with its robust design and the standard elevating comfort cab, especially for challenging tasks in the recycling industry.

Built to meet the demands of tough material handling: the new Sennebogen 340 G 4-tonne telehandler. To be seen at bauma 2022

Built to meet the demands of tough material handling, the 340 G is, above all else, robust and high-performing. A solid steel frame and a well-thought-out telescopic boom design ensure reliability and durability in demanding continuous operation. The combination of compact machine dimensions, four tons load capacity, a stacking height of 7.70 m and a remarkably long wheelbase of 3.10 m, which guarantees stability in every situation, make the telehandler a true all-rounder in recycling plants, composting plants, municipalities and industry.

A telehandler like no other: the advantages of SML power

The newly developed Sennebogen telehandler combines the advantages of telescopic handler and wheel loader technology in one machine. This unique concept is summarized in the term SML power. SML power stands for the best power transmission and maximum breakaway torque thanks to Z kinematics. In addition, there is the powerful drive train, which enables high tractive forces and driving speeds, as well as the multifunctional versatility, as the powerful hydraulics enable the operation of numerous attachments. The reversible fan installed as standard ensures optimal air intake even in dusty locations and thus the best cooling output and performance in hard continuous operation.

The viewing height of up to 4.10 m allows the operator optimal visibility in the loading process

The unique selling point: the elevating cab

The unique machine concept is rounded off by the elevating comfort Multicab, which is installed as standard in the 340 G. Generous glass surfaces provide a 360° all-round view, and the cab elevation can also be controlled variably and conveniently via foot pedals in the cab. With an eye level of up to 4.10 m, the operator can enjoy optimum visibility in the loading process, with a good view over the boom as well as a direct view from above into the trucks and containers. Of course, the new Multicab also offers

Photos: Sennebogen

operator comfort – supported by ergonomically arranged, resonant control elements and the air-sprung comfort seat, as well as protection against excessive noise and movement vibrations, the operator can concentrate on the essentials. The standard air-conditioning system ensures a pleasant workplace all year round.

Flexible and multifunctional

The 340 G shows it is flexible in more than just working modes. In street mode, the telehandler can reach speeds of up to 40 km/h in variable travel drive with its modern 100 kW Stage V diesel engine. In forklift mode, it proves to be particularly low, works more sensitively and more energy-efficiently, while in loading mode it mobilizes all power reserves in order to optimally load and transport bulk goods.

In addition, the machine is generally individually configurable and can be specialized for the requirements of industry, demanding material handling, recycling, biogas plants or contractors. With the Sennebogen hydraulic quick-changer, a wide variety of equipment can be changed at the push of a button, and it is also easy to equip them with trailers.

■ The Sennebogen 340 G will be on display at bauma 2022 – to be seen from 24 to 31 October at the Sennebogen stand at the FM.712 outdoor area, Messe München.

www.sennebogen.com

BREATHING NEW LIFE INTO RDF AND SRF

As the war in Europe continues, the pressing matter of identifying energy alternatives is soaring. A trend in the waste management market seems to indicate that the waste materials RDF (Refused Derived Fuel) and SRF (Solid Recovered Fuel) are making a comeback.

RDF and SRF are terms used when referring to processed waste for use in WtE (waste-to-energy) facilities or cement kilns for energy generation. Generally, the two materials are distinguished based on the amount of processing: SRF has undergone additional processing, leaving the material a higher and more consistent calorific value than RDF, ideal for use in incineration to reduce the amount of build-up and furnace downtime.

Orkel is experiencing a rise in the number of RDF and SRF inquiries. The questions often revolve around the bale-ability of these materials as plant managers seem to seek out efficient ways of transporting fluffy material.

Ideally, a method to ensure simplified storage and cost-efficient transport to maximize the profitability of RDF and SRF should be applied. Through comprehensive development processes,

Orkel's engineers found that high-density baling technology provides the sought-after characteristics of efficient storage and transport, assuming that the machine is specialized in handling small-fragmented material to prevent flyaway. Additionally, applying Orkel Telematics technology allows the customer to effortlessly scan each bale's tag and view its content and place of origin. As a result, the high-density round bale is easy to label and sell independently, assuring that a WtE facility can purchase the required material to keep the operations running.

Despite the logistical challenges, it is exciting to witness how the waste management industry is breathing new life into waste materials due to the rising oil prices. To start a dialogue on how to store and transport fluffy materials such as RDF or SRF, feel free to contact the Regional Sales Manager Michael de Lima Ribeiro (michael@orkel.no).

www.orkel.com/en/

Photos: Orkel

A SHREDDER NOT ONLY FOR RDF PREPARATION

Many companies use the VEZ 3200 pre-shredder for more than just RDF tasks, German manufacturer Vecoplan says.

Photo: Vecoplan

The VEZ 3200 is a powerful single-shaft pre-shredder that enjoys worldwide success in RDF processing

According to the company, since its market launch in 2018, the feedback from manufacturers of RDF (Refuse-derived fuels) for the VEZ 3200 (Vecoplan RDF shredder) has been outstanding. “With the VEZ 3200, plant operators can process materials such as household, industrial and production waste, and even bulky waste in either one or two stages – with the result that the machine is being increasingly used in the recycling industry.”

“We were able to place a lot of machines in the global market,” Martina Schmidt, Head of the Recycling I Waste division of the engineering company, is quoted. The VEZ was low-maintenance and had excellent levels of throughput capacity and energy efficiency. These qualities have convinced many companies.

As reported, more and more cement works are relying on RDFs to reduce the use of expensive primary fuels such as coal and oil in their particularly energy-intensive production, but also to minimize their environmentally harmful CO_2 emissions. In the past, RDFs processed from household, industrial and commercial waste were usually only fed into main burners, with the material pre-shredded and post-shredded in a two-stage process, which achieved the required quality. To raise the substitution rate even more, however, an increasing number of plant operators are also using the processed RDFs at the calciner. Here the material must have a high degree of homogeneity, but not the very fine grain size that is required for the main burner. “The VEZ 3200 is so powerful that it can produce a specific particle size of output material in a one-stage process, so these users now need only one shredder,” Vecoplan assures. An increasing number of recycling companies – such as regranulate manufacturers – are now also using the machine. “Here the quality must be almost as good as new material, and the VEZ shreds pre-sorted, post-consumer plastics,” the German provider gave account. “The result is a homogeneous output in large quantities that can be safely fed to downstream processes.” The VEZ would also master the shredding of old mattresses.

vecoplan.com/en/

K 2022

October 19 – 26, 2022, Düsseldorf (Germany)

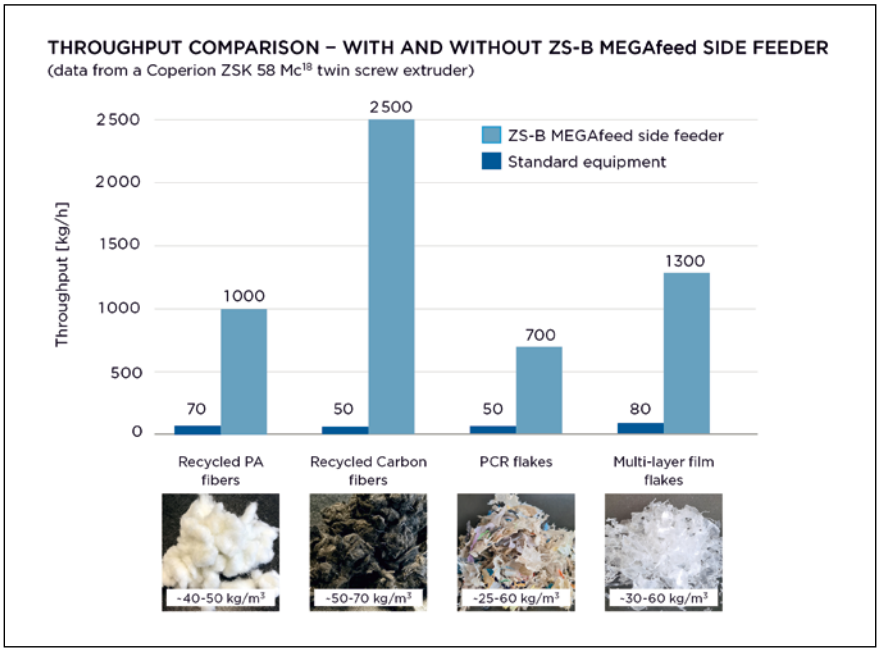
In 2022, like every three years, the trade fair K in Düsseldorf will once again be the most important information and business platform for the global plastics and rubber industry, the organizers are convinced. “Nowhere is the internationality as high as in Düsseldorf.” According to Messe Düsseldorf, for K 2022 from 19 to 26 October around 3,000 exhibitors from 61 nations are expected, and the Düsseldorf Exhibition Center is completely booked. Furthermore, this year K in Düsseldorf can look back on a success story of 70 years. “It is the most relevant information and business platform of the plastics and rubber industry worldwide,” the organizers underlined. “Its position as the leading trade show for the entire industry, where theme leadership and innovation go hand in hand to pave the way for visions for the future, is undisputed.”

www.k-online.com

SIDE FEEDER ALLOWS MORE ECONOMICAL PLASTICS RECYCLING

Plastics previously considered not recyclable are becoming a valuable raw material using the new Coperion ZS-B MEGAfeed, the German company assured.

Coperion has developed a new version of its ZS-B side feeder with the goal of making recycling of lightweight, high-volume fiber and flake recyclate more economical. “Using the innovative ZS-B MEGAfeed, plastic recyclate with a bulk density under 200 kilograms/cubic meter, long considered intake-limited and thus not worth recycling, can be reliably fed in large quantities into Coperion’s ZSK twin screw extruder and be concurrently recycled and compounded,” the manufacturer with locations in 17 countries on three continents informed.



As reported by the company, the feeder’s novel design makes it possible to feed very high rates of fiber and flakes, such as PA (polyamide), PE (polyethylene), PET (polyethylene terephthalate), and PP (polypropylene). “As a result, the ZSK twin-screw extruder’s high capacity can be fully exploited when the ZS-B MEGAfeed is used. Very high throughputs in both mechanical and chemical recycling of post-industrial and post-consumer waste are achieved.” According to Coperion, with a ZSK 58 Mc18 twin-screw extruder, the throughput increase, and thus the potential of the new ZS-B MEGAfeed becomes clear. When recycling PA fibers with a bulk density of about 40-50 kilograms/cubic meter, throughputs of 70 kilograms/hour (kg/h) were previously achieved using conventional equipment, the firm gave account. When the PA fibers were fed into the ZSK extruder using the ZS-B MEGAfeed, throughputs rose about fourteenfold to 1,000 kilograms/hour. “Similar results were achieved recycling carbon fibers; in this case, throughputs increased from 50 kg/h to 2,500 kg/h using the ZS-B MEGAfeed. When recycling PCR (Post-Consumer Recycled) flakes, throughputs increased from 50 kg/h to 700 kg/h, and from 80 kg/h to 1,300 kg/h with multilayer film flakes.”

www.coperion.com/en

Photo: Coperion

RESPONSIBLY RECYCLING LOCAL WASTE THROUGH COLLABORATION ON CUSTOM TYRE SHREDDER MACHINERY

Established in 2005, Black-Ram Recycling is a waste tyre collector and processor based in Somerset, England. Born out of a need for waste collection in the area, Black-Ram initially processed tyres for land engineering purposes, including drainage applications and roadways. With a vision to be financially and environmentally responsible, Black-Ram's mission is to deliver zero waste tyre recycling within the UK.

Since 2015, Black-Ram has been focused on material and energy recovery, including recycling whole passenger car tyres for use in alternative fuel and feedstock markets.

Objective

In 2014, Black-Ram was at a crossroads. The tyre recycling industry was changing, and the leadership team was considering moving away from construction towards material and energy recovery which would require specialized tyre shredder equipment. Black-Ram researched what machinery would be needed to process waste tyres to a specification that would give them the most options. They also hoped to separate and recycle steel from the tyres. Lastly, they were looking to scale their business, which prompted the need for heavy-duty equipment.

By 2015, the Black-Ram team had started researching what machines were on the market to chop and process tyres for alternative fuel and feedstock use. They discovered that Eldan had tyre shredder equipment that would allow them to separate steel from the tyres and produce tyre chips that could go into a variety of further applications. The Black-Ram team took a tour of Eldan's Denmark factory and was impressed with what they saw.

Strategy

In 2015 negotiations began between Black-Ram and Eldan to provide a tyre shredder that would turn whole passenger car tyres into rubber chips for alternative fuels and feedstock. Eldan recommended and delivered a hydraulic Multi-Purpose Rasper MPR203 HD in 2016. The Eldan team, in conjunction with Black-Ram engineers, oversaw the installation. An added feature, Eldan provided online equipment monitoring assistance to ensure prompt problem resolution.

After the initial installation, the Eldan and Black-Ram teams realized that modifications would be necessary to achieve the desired product. In collaboration with Eldan's R&D department, a new knife system was developed and tested on-site at Black-Ram. With the modifications in place, Black-Ram was able to transform passenger car tyres into rubber chips. The team quickly realized that greater capacity was needed. Eldan recommended that Black-Ram install a Super Chopper in front of the Multi-Purpose Rasper, which increased the capacity two to threefold.

"One reason we chose Eldan was their lead time on parts. In this industry it's critical to minimize downtime."
"I would absolutely recommend ELDAN. You get what you pay for. We've tried other suppliers for parts, but we keep coming back to Eldan." Henry Hodge, Owner Black-Ram, said.

Outcome

The Black-Ram team was able to achieve their goal of creating high volumes of quality clean-cut rubber chips. The effort proved to be such a success that after the addition of the first Super Chopper SC1412 FD150 in 2020, Black-Ram added a complete

Photo: ELDAN Recycling A/S

tyre chip line with a Super Chopper and a Multi-Purpose Rasper in 2021. Utilizing the customized tyre shredder equipment, Black-Ram was able to reach the goals regarding capacity, steel wire recovery, output size, and flexibility. To date, Black-Ram has installed four Eldan tyre shredders, allowing the company to increase local employment and expand the geographic footprint of the business. The Black-Ram team continues to rely on Eldan for reliable parts and online monitoring assistance and is pleased with the outstanding relationships they have built with the Eldan team.

Get in touch

To learn more about how Eldan equipment can help you achieve growth goals for your business, contact the Eldan team.

www.eldan-recycling.com

COST-SAVING TORQUE LIMITER FOR DIRECT DRIVES

To protect – also in the recycling sector – machines and systems from expensive overload damage, safety clutches, overload clutches or torque limiters are used. If an overload in the drive train occurs, the torques set too high can damage or even destroy the drives.

A cost-saving alternative for direct drives is offered by the German company Enemac with the torque limiter type ECUD. According to the company, it is a combination of a torque limiter with a keyway to protect from collisions and a jaw coupling with a clamping hub. The jaw element of the coupling compensates as well splicing as vibrations and acts as electrical isolating, the provider assures. “The type ECUD can compensate axial misalignment of 0.5 – 1 mm and lateral misalignments of 0.1 to 0.15 mm. The torque range is available from 1.8 Nm up to 2000 Nm in 14 different sizes. The hubs can be sized between 6 mm and 90 mm,” Enemac informed. “This coupling offers high torsional stiffness and is free of wear and maintenance.

Photo: ENEMAC

The one-sided mounted, easy to assemble clamping hub joins mandrel and torque limiter free of clearance and force fitting. If required it can also be equipped with a keyway.” Special versions were available on request.

As reported, for demanding environments Enemac also offers this safety coupling as corrosion-resistant variant ECUD_KS. “For this purpose, the main components of the torque limiter are nitro-carburized or gas-nitrided and then oxidized. The built-in disc springs are coated, and screws, balls and bearings are made of stainless steel. That makes the coupling type suitable for many outdoor applications and wherever moisture could become a problem,” the information said.

www.enemac.de

Recycling to Create New Value:

SOLUTIONS FOR ALUMINUM PROCESSING

FOR REC's commitment to a more efficient recycling process.

The increasing consumption of resources and the rapid technological change are contributing to a rising need of investment in advanced and material-specific recycling systems. One of the most valuable materials that can be recycled is aluminum. Indeed, thanks to its characteristics, this metal is considered a circular material, capable of being recycled multiple times without losing its original properties. Furthermore, its recycling process only requires five percent of the energy needed to produce it primarily, making the process very convenient and attractive.

FOR REC takes great care on regulations against environmental pollution, designing customized and high-performance machines for the recycling of the aluminum and other materials. These solutions allow the treatment of metal to obtain new resources usable for future processes. In addition, the plants are specifically developed to reduce the volume of aluminum and select the most appropriate materials for reuse.

The line developed by FOR REC's internal department has been designed to make the product ready for the furnace, and it is composed of two essential parts:

- Hammer mills: extremely powerful and fast processing, which allow the grinding of heterogeneous materials;
- Single shaft shredder: built with high quality steel, ideal for the treatment of metals.

Hammers mills for aluminum processing

FOR REC hammer mills are realized with a sturdy structure, which make them very trustworthy, and are designed to ease the access to the parts subject to wear and tear, making the maintenance faster.

Main advantages:

- Hydraulic opening system for the upper cover
- Hydraulic lifting of the rotor by means of the upper cover lifting
- Hydraulic opening for the discharge of foreign bodies
- Screen fixed by the upper cover
- Customizable hammers
- Adjustable cutting plates
- Cutting chamber with changeable armours made of anti-wear material
- Special anti-vibrators to reduce stresses on the machine support frame
- Inverter for rotors revolutions control

Single shaft shredder for aluminum processing

Thanks to its enhanced structure and low running rotor, FOR REC single shaft shredder combines the traditional cutting system with a technology based on interchangeable plates

Photos: FOR REC

equipped with special shock absorber bearing that protects from possible breakdowns. Everything has been designed to ensure maximum reliability, fast maintenance, and considerable production increase.

Main advantages:

- Special steel blade-holder shaft with surface heat hardening to reduce wear
- Belt transmission with chain gearbox in oil bath
- Interchangeable wear-proof selection screen for a fast maintenance
- Spiral lateral seals for a safer working process
- Configurable blades for thickness and number of teeth

The systems designed and manufactured by FOR REC have multiple and customizable solutions according to the kind of material to treat (cast aluminum, UBC bales, aluminum profiles both loose or baled). Many different machines have already been installed in Italy and all over the world. Turkey represents the top market, with around ten operative systems (single machines or complete lines).

■ Are you interested in knowing more about FOR REC aluminum recycling plants? Visit the website www.for-rec.eu

CLOTHES HANGER RECYCLING IN COLOMBIA

In the manufacturing of plastic clothes hangers, the Colombian company Plásticos Ojara benefits from the advantages of internal recycling.

The Colombian company is located in the idyllic south of the city of Medellin, Germany-based manufacturer Weima reported in a success story. “Thanks to the use of a WLK 4 single-shaft shredder, it is possible to recycle rejected products on-site and return the material to the production process. In this way, waste can be effectively avoided, the purchase of raw materials can be reduced, and previously unused residual plastic is given a second life.”

According to the information, the Latin American company was looking for a way to further optimize production and at the same time make it even more environmentally friendly. Those responsible at Plásticos Ojara decided not to dump rejects in the future, but instead reintegrate the raw material into the manufacturing process. The cycle begins with an industrial shredder.

The WLK 4 single-shaft shredder has a working width of 600 millimeters and an electromechanical drive with Weima‘s own WAP gearbox in combination with a V rotor and a generously dimensioned hopper in log space design, the report provided by the German engineering firm said. “This prevents feed material from forming bridges. As a rule, it is operated with a throughput of approx. 350 kilograms per hour, but a higher throughput is also possible with continuous feeding. The rotor cutting blades can be flipped several times when worn, which drastically reduces the machine‘s maintenance costs. The shredder can be operated intuitively via the touchscreen display.”

Plásticos Ojara uses only polypropylene (PP), polystyrene (PS), and polyethylene (PE) to produce hangers. Around 250,000 kilograms of these materials are processed every day, most of which come from the company‘s own production. Waste generated in the production process (e.g. during start-up and shut-down) is shredded by the WLK 4, then granulated and returned to the manufacturing process to produce new hangers. Around 30 percent of the clothes hangers are now made using regranulate. In addition to recycling in-house waste, the company also collects old clothes hangers from surrounding customers or stores.

weima.com/en/

The WLK 4 single-shaft shredder at Plásticos Ojara

Photos: Weima

LIEBHERR PRESENTS NEW MATERIAL HANDLERS

At this year's Bauma exhibition (October 24 – 30, 2022; Trade Fair Center Messe München), Liebherr will present material handlers for diverse applications.

With the LH 22 M Industry Litronic Liebherr – one of the largest construction machine manufacturers in the world – presents a material handler for efficient use in tree care and the timber industry. Furthermore, the Swiss-based corporate company exhibits two representatives of its electric material handlers: the LH 26 M Industry E with battery-operated Mobility Kit and the LH 150 M Port E with a new, mobile gantry portal undercarriage.

LH 26 M Industry E

This material handler can also be used in recycling in addition to applications in scrap handling. The wired electric material handler is equipped with a battery-operated Mobility Kit for temporary operation independent of the mains.

According to the manufacturer, examples of its possible applications are the handling, unloading and sorting of waste paper, waste wood and waste materials. "High machine availability is guaranteed with the innovative recycling package from Liebherr," the company underlined. "The reversible fan increases the productive work time, while the radiator and protective grid can be blown by the reversal of the fan's direction of rotation. The separate position of the climate condenser maximizes the air stream in the radiator and fan unit to guarantee a high level of reliability even in very dusty conditions."

The LH 26 E on display is configured with a 6.60-meter straight boom and a 4.50-meter stick with tilt geometry. It is fitted with a Liebherr SG 25B sorter grab (capacity: 0.75 cubic meters) and perforated shells with a width of 1,000 millimeters. "This model also features the height-adjustable hydraulic operator's cab," Liebherr gave account. "The cable feed operates with a cable winding system that allows the machine to move safely within a working radius of 40 meters, or more upon request."

LH 150 M Port E

The machine is specially designed for handling bulk goods and general cargo in ports. It is equipped with an electric drive and has an operating weight of around 165 tons. With the 400 kW electric motor, it can reach an overall system capacity of 614 kW together with the ERC system, the producer informed. "The electrical drive concept of the material handler is low maintenance, quiet, environmentally friendly and independent of exhaust gas regulations." The machines presented at Bauma will be provided with a 16.5-meter-long, angled boom and a 15-meter-long straight stick. "The fully automatic MH 110B quick coupling system allows attachments to be changed quickly, comfortably and safely from the operator's cab," the internationally active company stated. "The Liebherr GMZ 120 clamshell bucket with fill volume of 8 m^3 and the Liebherr GMM 120-5 multi-tine grapple with fill volume of 3 m^3 round off the configuration."

Another highlight was the height-adjustable double-articulated hydraulic operator's cab that could be moved forward for comfortable entry and exit. "With the flexible eye point, the machine operator always has an optimal view of the working area, which boosts the productivity of the machine."

www.liebherr.com

The LH 26 M Industry E at Bauma 2022: The wired electric material handler is equipped with a battery-operated Mobility Kit for temporary operation independent of the mains

Photo: Liebherr

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CONTINUOUS IMPROVEMENT ENSURES PERFORMANCE CAPABILITY

According to plant manufacturer Stadler, the firm has supported UK-based company J&B Recycling in achieving the best quality output material possible. The latest upgrade, completed in March 2022, has improved quality and increased capacity to anticipate the growing demand.

Stadler's relationship with J&B Recycling began in 2008 when it designed and built its dry mixed recyclables plant in Hartlepool, United Kingdom. It has remained at their side ever since, supporting the company in a continuous improvement process of the plant. "Our focus is producing the best quality material possible," Matt Tyrie, Operations Director at J&B Recycling, was quoted.

The composition and density of dry recyclable waste is in constant evolution. For this reason, sorting plants need to be able to process multiple materials flexibly while delivering the consistently high purity rates demanded by the recycling industry. The plants' design also needs the flexibility of accommodating subsequent upgrades and modifications to meet the changing requirements. In 2017, the two companies worked together on a concept to remove paper and aluminum. To separate the paper, Stadler's team added to the process an optical sorter (Tomra Autosort) on the flat fraction line to recover a high percentage of paper with fewer contaminants and a pass through a quality control cabin to ensure high purity. To remove aluminum, an Eddy Current Separator was installed to recover the non-ferrous material from the 2D flat fraction line.

Higher purity of the paper and increased capacity

Since then, six further upgrades have been carried out to optimize the plant and meet the evolving market demands. The latest upgrade aimed to achieve even higher purity of the paper and increase capacity, which has now been raised to 15 tons per hour. According to Matt Tyrie, the quality of the hard mix grade increased by adding a Laser Object Detection (LOD) system to the optical sorter, to remove more non-fiber contamination. "This technology allows each shift to run with reduced labor, and it has allowed the throughput to increase, as the quality of the hard mix was a bottleneck on the plant."

A dosing drum feeds the material, which goes through a pre-sort platform for the manual removal of OCC (Old Corrugated Containers) and large film. A screening drum separates the remaining material into three fractions: Fines, Midsize and Oversize. The Oversize materials (above 170 millimeters), go through a Quality Control cabin and optical sorter to remove mixed paper, cardboard and plastics and produce a PAMS (Newspapers, Periodicals and Magazines) fraction. The Midsize fraction, below 170 millimeters, is separated into Fines, 2D and 3D fractions by the Stadler STT2000 ballistic separator. The 2D flat fraction is processed through Eddy Current Separators and Autosort optical sorter before a final Quality Control check to produce two streams, mixed paper fraction, and non-ferrous and ferrous fractions. The 3D rolling fractions follow a similar process, which begins with an Overband Magnet, to produce mixed plastic, HDP and PET fractions.

Fines are being processed to remove contaminants to create a glass product. All the output fractions, except for glass, are baled and sold.

www.w-stadler.de

Recycling plant built by Stadler upgrade

Recycling plant before upgrade

Photos: Stadtler

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AIR-BASED TECHNOLOGY FACILITATES PLASTICS RECOVERY

According to England-based company Impact Air Systems, utilizing air-based technology to conduct waste sorting tasks is in huge demand due to its cost-effective and efficient technique.

This is why this kind of technique is being selected for use in many recycling facilities around the world, saving thousands of tons of recyclable plastics, and other materials, ending in landfill, Impact Air Systems highlights one significant advantage of air-based systems.

As stated, such material recovery solutions from industry experts "are leading the way with various options to suit a wide range of plastic applications. The Impact Film Vacuum System and Airlift solution removes plastic bags and films from the waste stream and bales them with a screw compactor system. Zigzag separation provides an efficient and effective solution to remove dust, debris, and fibers from rigid WEEE plastic, granules, and flakes to provide a more valuable product for recycling. Impact's Pneumatic Conveying System seamlessly transports plastic bottles and containers through the facility via a ductwork system to external storage containers or bunkers."

The company points to examples, which show the variation of plastic materials that can be recovered along with the alternate use of air-based technology to achieve resource recovery.

- Increased material value: Enva Resource Recovery, in Bourne, Lincolnshire, operates a plastic recycling system to recycle household rigid plastic material and plastic car components. This is needed to further improve the quality of the HDPE and PP granules by removing the lightweight fibers and debris. The facility consists of a shredder, metal removal process, granulator, and finally a plastic grade segregation process. The finished product is then collected into two-ton storage sacks for resale.

Impact Air Systems installed a Zigzag separation system to improve the quality of the final product by removing the light fibers and debris from the final material stream to boost its resale value. The Impact Zigzag Air Classifier (ZAC), Air Drum Separator and Pneumatic Transfer system were also installed to recover the plastics from the WEEE material to divert it from landfill and increase its resale value.

- Removing plastic film and bags: Impact worked with CP Manufacturing and MSS Optical, USA on a process improvement project in Calgary, Canada providing a solution to remove plastic film and bags from the material stream. "As quality demands are heightened, our client selected optical separation quality control along with the Impact Plastic Film Airlift solution, to ensure higher quality waste streams are achieved," reported the British firm, which works with many sectors around the world, delivering trim extraction and waste separation using air technology solutions.

"Air technology at its best"

According to the provider of air systems, Impact's Plastic Film Airlift is an innovative solution designed to work in conjunction with optical sorters to capture film that has been rejected from the material stream by the optical sorter air injection. "Flexible plastics captured by the Airlift are discharged from the conveying air stream via the rotary separator and deposited into the bunker below, removing the contaminant material at high volume, enabling it to be recycled."

As underlined, the company's solutions would ensure higher quality material streams along with increased revenue from recovered recyclable materials. "They also greatly assist the operator in achieving zero waste targets while encouraging the circularity of plastics aiding the transition towards a circular economy."

www.impactairsystems.com

Photo: Impact Air Systems Ltd

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ECOMONDO AND KEY ENERGY 2022

November 8 – 11, 2022, Rimini (Italy)

The spectrum of the exhibitions spans from climate change to recycling materials and the transition from fossil fuels to renewable energies. Furthermore, environmental challenges and opportunities in North African and sub-Saharan countries will be the focus of part of the debate at Ecomondo and Key Energy 2022. Both are events organized by IEG – Italian Exhibition Group. According to the organizing team, visitors will be greeted "by a solid proposal of global conferences" developed by the Ecomondo and Key Energy Technical-Scientific Committees, in which the European Commission will also participate. A range of conferences and seminars would feature international, national and local institutions, public and private companies and the scientific world. African embassies, governments and institutions will be meeting at the second edition of "Africa Green Growth", IEG announces. Growth opportunities in the fields of "Green Hydrogen" and "Water Energy and Food Nexus" with a focus on the circular economy and youth entrepreneurship in Africa's ever-increasing integration into world economy circuits would be discussed. The event will be organized by RES4-Africa and the Ecomondo-Key Energy Scientific Committee with the support of the ITA-Italian Trade Agency, the Ministry of Foreign Affairs and International Cooperation as well as the Ministry of Ecological Transition.

www.en.ecomondo.com

CIRCULAR PLASTICS PACKAGING ASIA

November 23 – 25, 2022, Bangkok (Thailand)

The conference will take place in Bangkok from 23 to 25 November, with discussions surrounding the following themes:

- Accelerating Asia's plastics packaging circularity and collaborations across the supply chain
- Closing the loop with mechanical & chemical recycling for higher quality recycled plastics

According to the organizer CMT (Centre for Management Technology, Singapore), there is no doubt that plastic is an important packaging material. "Keeping them in use for as long as possible and preventing them from ever becoming waste is the principle for a circular plastics economy. In Asia, many countries still are lacking behind on an effective waste management and support from a strong recycling industry." However, there were reasons for optimism and the tide changing, CMT emphasized.

As brand owners push on with sustainability commitments and usage of recycled plastics, plastics recycling projects in the region are ramping up, and regulations for allowing recycled plastics for food contact packaging are in rapidly evolving "It is predicted that demand for food-grade rPET will grow rapidly, perhaps 10-15 times by 2030."

www.cmtevents.com/aboutevent.aspx?ev=221133&

WORLD CIRCULAR ECONOMY FORUM 2022

December 6 – 8, 2022, Kigali (Rwanda) and online

The Global South will be in focus at this year's World Circular Economy Forum (WCEF). Titled "From Africa to the World", the event will be held in Kigali, the capital and largest city of Rwanda, and online, with studios held in several cities across Africa. Global studios may also take place in Africa and around the world. "Held already for the sixth time, the annual global collaboration forum will not only bring people together in Kigali, Rwanda but also throughout Africa," the organizers underline. "To engage people and enable a broad local participation, WCEF2022 African Studios will bring the program of the main event live streamed on a big screen in select locations around Africa and give an opportunity for discussions on local circular economy examples and networking." WCEF2022 will be hosted jointly by the Republic of Rwanda, the African Circular Economy Alliance (ACEA), the African Circular Economy Network (ACEN) and The Finnish Innovation Fund Sitra, with international partners. Rwanda is one of ACEA's founding members and the secretariat is hosted by the African Development Bank.

www.wcef2022.com

SAMOTER 2023

May 3 – 7, 2023, Verona (Italy)

The dates for SaMoTer as an attended show at Veronafiere have been set. The organizers announced that the international construction equipment trade fair will be held 3-7 May 2023.

The 31st edition of SaMoTer would highlight the key role that the construction equipment industry is destined to play regarding environmental sustainability and the development of the economic models outlined by the New Green Deal. "A vital turning point to promote the innovations introduced to reduce emissions and promote recycling of the materials used on construction sites. A rational approach to sustainability involving significant efficiency improvements and the consequent reduction of economic and environmental costs, as well as overall improvements in performance."

www.samoter.it/en/

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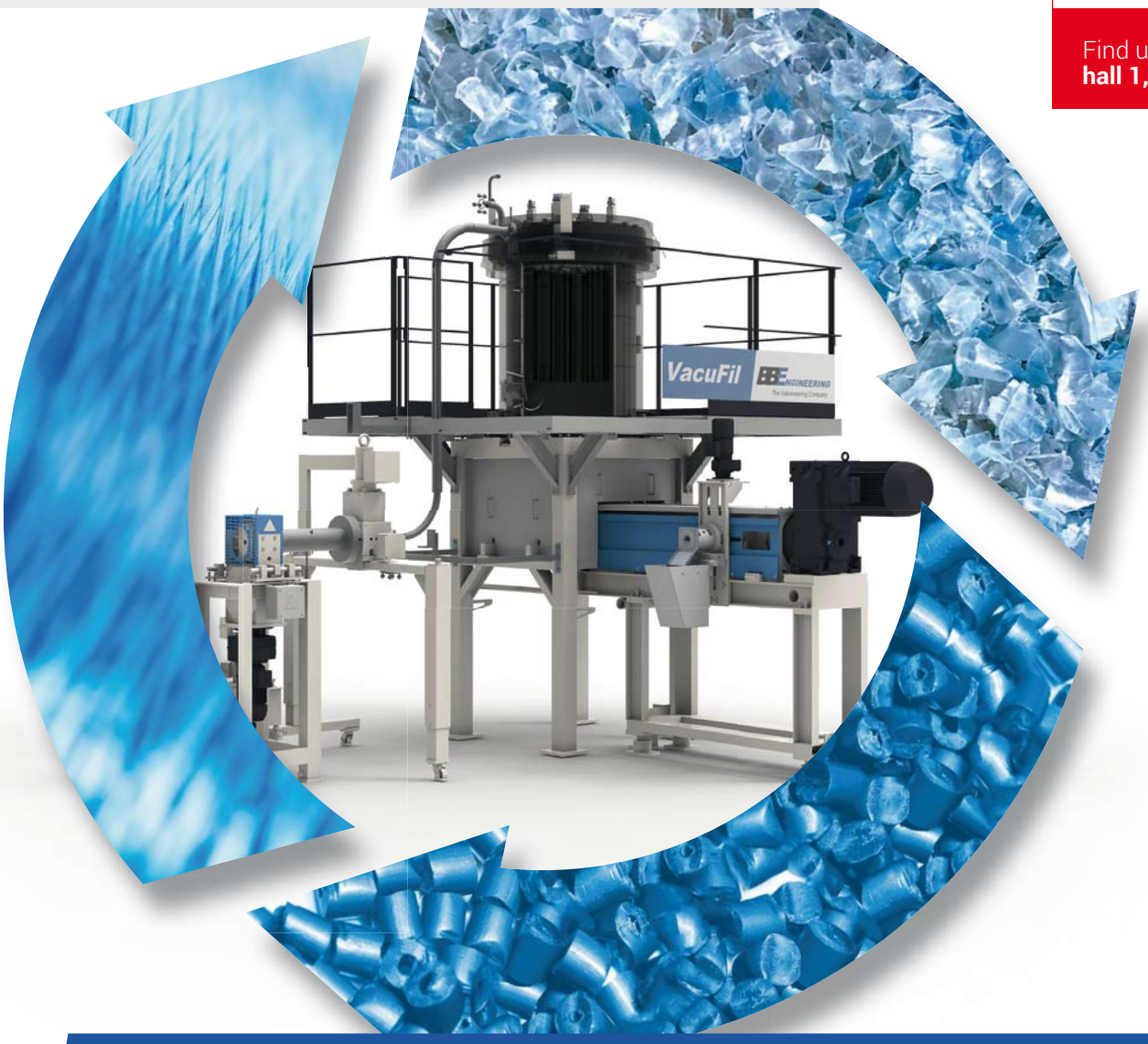

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